TM 11-5820-461-35

DEPARTMENT OF THE ARMY TECHNICAL MANUAL

FIELD AND DEPOT MAINTENANCE MANUAL

RADIO SETS AN/GRC-50(V)1, 2, 3, 4, AND 5

HEADQUARTERS, DEPARTMENT OF THE ARMY
26 JULY 1962

WARNING

DANGEROUS VOLTAGES EXIST IN THIS EQUIPMENT

Be careful when working on the 115-volt ac input connections. Serious injury or death may result from contact with these terminals.

DON'T TAKE CHANCES!

EXTREMELY DANGEROUS VOLTAGES EXIST IN THE FOLLOWING UNITS:

Power Supply PP-2054/GRC, Transmitter, Radio T-893(P)/GRC, and Amplifier-Oscillator AM-1957/GRC or AM-1958/GRC	800 volts, 650 volts, and 640 volts.

Technical Manual
No. 11-5820-461-35

HEADQUARTERS,
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CHAPTER 1
INTRODUCTION

1. Scope

a. This manual covers repair data for Radio Sets AN/GRC-50(V)1, 2, 3, 4, and 5. It includes block diagram theory, voltage and resistance measurements, cable fabrication instructions, and complete schematic diagrams. The AN/GRC-50(V)1, 2, 3, 4, and 5 will be referred to as the *radio set* throughout the manual. Refer to TM 11-5820-461-10 for differences between models. This publication represents the information available at this time.

b. The complete technical manual for this equipment includes TM 11-5820-461-10, TM 11-5820-461-20, TM 11-5820-461-20P, and TM 11-5820-461-35P.

c. Refer to DA Pamphlet 310-4 to determine what Changes to or revisions of this publication are current.

2. Comments on Manual

Forward comments concerning this manual direct to the Commanding Officer, U. S. Army Signal Materiel Support Agency, ATTN: SIGMS-MPP-4, Fort Monmouth, N. J.

Note: For applicable forms and records, see paragraph 2, TM 11-5820-461-10.

CHAPTER 2

BLOCK DIAGRAM THEORY

Section I. RADIO SET THEORY

3. General

a. The radio set is a microwave transmitter-receiver which provides two-way communication of multiplex intelligence in the uhf band. The radio set, with accessory equipment, is used as a radio link in a communication system.

b. Multiplex signals are used to frequency-modulate an rf carrier provided by the radio set in either of two frequency ranges: 601.5 through 999.5 mc (channels 1 through 399) or 1350.5 through 1849.5 mc (channels 400 through 899). Traffic consists of either frequency division multiplex (fdm) signals or signals of the pulse code modulation (pcm) type. A total of 899 rf channels are available in the two operating ranges. In addition to the 4, 12, or 24 channel multiplex signals on the selected rf channel, an order wire (ow) circuit permits voice communication between the stations in a system during fdm or pcm operation.

4. Signal Paths

a. Received Signals.

(1) Fdm or pcm modulated rf signals transmitted by the distant station are received by the antenna and applied through the duplexer in the amplifier-oscillator in Radio Transmitter T-893(P)/GRC to the amplifier-converter in Radio Receiver R-1148(P)/GRC where the incoming signals are converted into a first intermediate frequency (if.) of 60 mc. The local oscillator is controlled by the automatic frequency control (afc) assembly which samples the output of the local oscillator in the amplifier-converter and corrects the operating frequency of the local oscillator, if required. The modulated 60-mc signal is amplified and applied to the second if. amplifier, where it is converted into a second if. of 17 mc and amplified. The second if. is demodulated and applied to the receiver baseband assembly.

(2) During fdm operation, the fdm signals and ow signals are amplified and coupled out of the receiver baseband assembly to the fdm multiplex equipment or to another radio for retransmission. Retransmission depends upon whether the radio set is used as a terminal or repeater station. Order wire signals are separated from the fdm multiplex signals and distributed through order wire circuits in the receiver baseband and receiver frame to the local handset or the remove 2-wire line. Order wire circuits include a ringing signal of 1,600-cps which causes the INCOMING CALL lamp to light and the buzzer to sound.

(3) During pcm operation, the received pcm signals are amplified and shaped through the pcm channel of the receiver baseband and connected out of the receiver baseband assembly to the pcm equipment. The pcm multiplex equipment separates the order wire signals from the composite pcm signal and returns it to the radio set on the PCM ORDER WIRE connector on the R-1148(P)/GRC for local distribution. For retransmission, the pcm multiplex equipment generates a new input signal for the next radio set.

(4) Provisions are made to monitor essential levels within the R-1148(P)/GRC and to measure test tones received for the purpose of system level setting.

b. Transmitted Signals.

(1) During fdm operation, fdm signals from fdm multiplex equipment or another radio set (depending upon how the equipment is being used) are connected through R-1148(P)/GRC to the transmitter baseband assembly. The fdm signals are amplified in the transmitter baseband and applied to the modulator assembly, where they are used to frequency-modulate a 50 mc oscillator. The modulated 50 mc signal is amplified in the modulator assembly and connected to the amplifier-oscillator. The modulated 50 mc signal is heterodyned in the amplifier-oscillator with a variable local oscillator which operates in the range of 651.5 through 1049.5 mc, or 1400.5 through 1899.5 mc. The difference frequency is selected as the output frequency, amplified, and applied to the antenna.

(2) The frequency of the 50 mc oscillator in the modulator assembly is automatically controlled by coupling a portion of the transmitted rf signal from the amplifier-oscillator to the afc assembly. An afc error voltage is supplied from the afc assembly to the modulator assembly, if required, to correct the frequency of the 50 mc oscillator.

(3) During fdm operation, order wire signals originating at the fdm multiplex equipment (or received with the fdm signals from another radio set) follow the same path as described in (1) above. In addition, a portion of the ow signal is sampled in the transmitter baseband and fed back to the ow circuits in the receiver baseband. The ow signals are amplified and routed to the handset and REMOTE ORDER WIRE line for monitoring purposes.

(4) During pcm operation, order wire signals may be added to the multiplexed transmission from either the local handset or the REMOTE ORDER WIRE line. These signals follow the same signal path as in fdm through the order wire circuitry as described in (1) above. The pcm multiplex equipment has no internal order wire circuitry. The remote line and field telephone or the handset connected to the radio set must be used.

(5) Provisions are made to monitor essential levels in T-893(P)/GRC and to use a locally generated 1000 cps test tone to check transmitter deviation. These circuits in conjunction with the next station receiver circuits allow system levels to be set and checked.

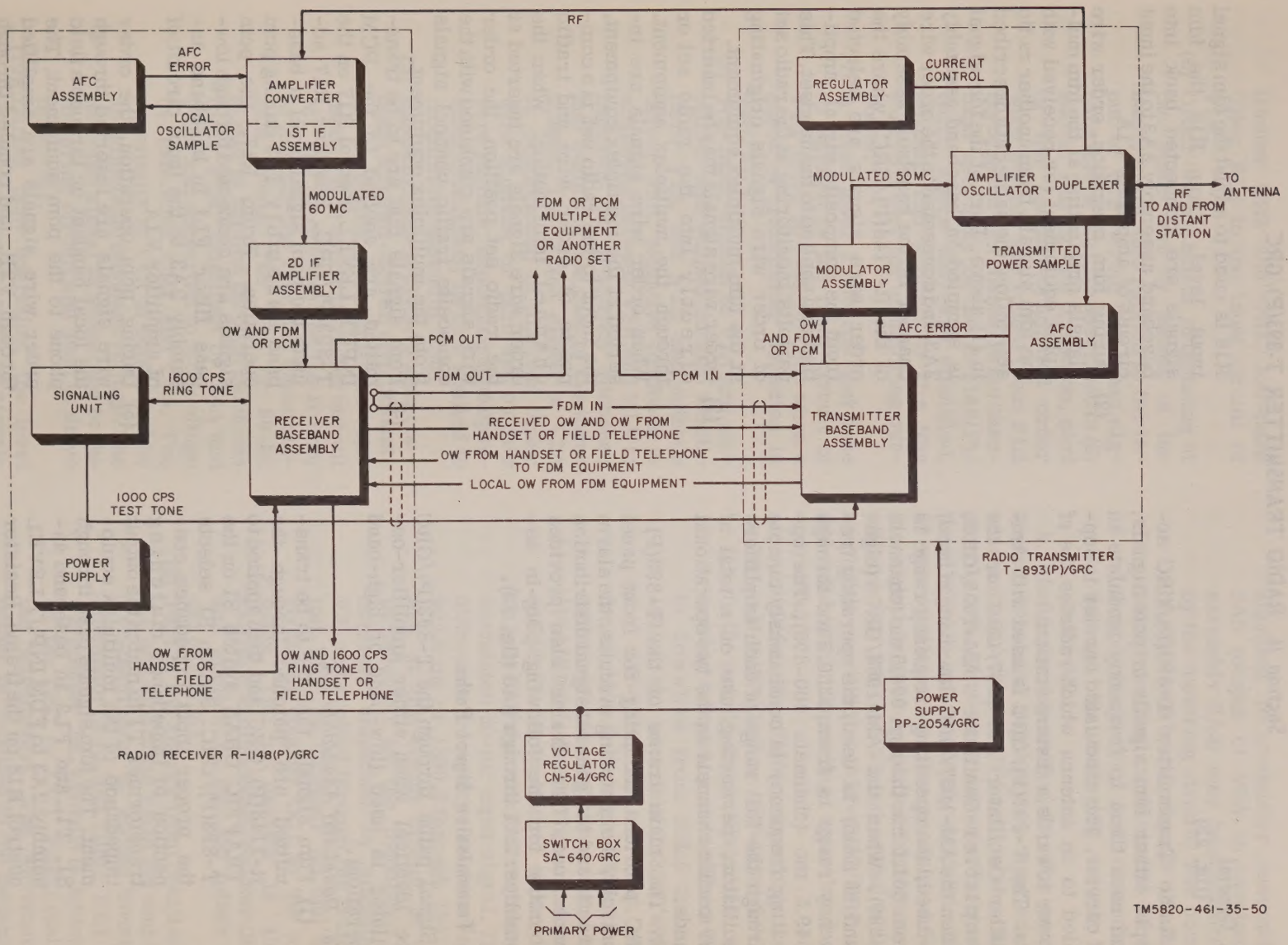


Figure 1. Radio set block diagram.

5. General
(fig. 23)

Radio Transmitter T-893(P)/GRC accepts either fdm signals or pcm signals, and uses them to frequency modulate an rf carrier. The modulated carrier is supplied to an antenna which radiates the rf power towards a distant station.

a. The T-893(P)/GRC is used with Amplifier-Oscillator AM-1957/GRC or the Amplifier-Oscillator AM-1958/GRC. When the AM-1957/GRC (low-band rf head) is used, the operating frequency range is from 601.5 mc through 999.5 mc (channels 1-399). When the AM-1958/GRC (high-band rf head) is used, the operating frequency range is from 1350.5 mc through 1849.5 mc (channels 400-899). The operating frequency is continuously tunable through the full range of each amplifier-oscillator, permitting use of a total of 899 traffic channels in the two operational bands.

b. The main frame of the T-893(P)/GRC provides mounting for front panel controls, the metering circuits, the alarm circuit, and the general signal distribution connections. The frame also provides mounting for the following plug-in assemblies: 2A1 through 2A6 (fig. 23).

6. Transmission Signal Paths

Signal paths through the T-893(P)/GRC are identical when either amplifier-oscillator is used (low-band or high-band operation).

a. Baseband Assembly 2A3.

(1) Fdm signals that are to be transmitted are patched through the R-1148(P)/GRC and then applied to TRAFFIC CHAN switch S1 on the T-893(P)/GRC. Switch S1 selects the proper input impedance connection to impedance matching transformer T1 to match the output impedance of the multiplex equipment. The fdm signals pass through S1, T1, and FL2 in baseband assembly 2A3 to FDM INPUT LEVEL control R18 on the frame. Resistor R18 is used to adjust the fdm signal input level. From R18 the fdm signals are connected back into baseband assembly 2A3 to the input circuit of amplifier V1A.

(2) During fdm operation, order wire signals originating at the fdm multiplex equipment (or received with the fdm signals from another radio set) follow the same path described in (1) above. Part of the fdm signal is sampled in baseband assembly 2A3 and connected to the order wire channel in the baseband assembly of the R-1148(P)/GRC, where the order wire signals are selected from the composite signal, amplified and applied to the handset. This permits monitoring at the radio set of order wire signals originating at the fdm multiplex equipment.

(3) Order wire signals may be inserted directly into the radio set or through the multiplex equipment. When order wire signals are inserted at the multiplex equipment, the input to the radio set is a composite of order wire and traffic channel information. When the order wire signals are inserted at the radio set position, the order wire signals are combined with the composite traffic channel signals from the multiplex equipment.

(4) Pcm signals that are to be transmitted are applied to the PCM INPUT LEVEL control R17 on the T-893(P)/GRC. Resistor R17 adjusts the pcm signal level to baseband assembly 2A3 during pcm operation. From R17, the pcm signals are connected through low-pass filter FL1 in baseband assembly 2A3 to the input circuit of of amplifier V1A.

(5) During pcm operation, the order wire signals are inserted through the local handset or through a field phone to the pcm equipment. The order wire signals are amplified through V2B, and coupled through

limiter CR2 and CR3, low-pass filter FL3 to the input circuit of V1A.

(6) Order wire signals originating at the radio set by means of the handset are also applied to the input of V2B. From V2B these signals follow the path described in (5) above. During fdm operation, part of the handset-originated order wire signals are routed from FL3 through the fdm channel in the baseband assembly of the R-1148(P)/GRC, where they are amplified, shaped, and applied to the fdm equipment for monitoring purposes.

(7) A fixed level 1,000-cps test tone is applied to the input circuit of V1A from R-1148(P)/GRC when a check of transmitter deviation is desired.

(8) The input signals to V1A are amplified and shaped through amplifiers V1A and V1B and cathode driver V2A. Negative feedback is employed between V2A and V1A to improve the frequency response and stabilize the gain of the three stages. The output signal of V2A (a combination of fdm and order wire signals, or pcm and order wire signals, depending upon operating conditions) is then applied to modulating assembly 2A5.

(9) Baseband assembly 2A3 also contains a meter-driver circuit similar to that of a vacuum-tube voltmeter. It is used with meter circuit M1 and S3 (mounted on the frame) to monitor the 1-kc and 68-kc signals levels. The 1-kc or 68-kc signal is applied through bandpass filter FL4, amplified by V4A and V4B, and converted to a dc voltage by detectors CR4 and CR5. The sensitivity of V4A is controlled by an adjustable feedback voltage. The detected signal is connected to the metering circuit and used to drive meter M1.

(10) During pcm operation, the level of the combined baseband signals supplied to modulator assembly 2A5 (output of V2A in baseband assembly 2A3) may be monitored by the metering circuit. The combined baseband signals are detected in the input circuit of dc amplifier V3, and connected through the metering circuit to meter M1.

b. Modulator Assembly 2A5. The combinded baseband signals are applied to reactance modulator V1 in modulator assembly 2A5. This assembly uses the baseband signals to frequency modulate the 50-mc oscillator V2. The modulated 50-mc signal is then amplified through amplifiers V3, V4, and V5 and routed to the amplifier - oscillator (AM - 1957/GRC or AM-1958/GRC depending upon band of operation).

c. Amplifier-Oscillator Assembly 2A1 or 2A2 (AM-1957/GRC or AM-1958/GRC).

(1) In the amplifier-oscillator the operating frequency of oscillator V1 is tunable from 651.5 through 1049.5 mc (channels 1-399) when the AM-1957/GRC is used, and from 1400.5 through 1899.5 mc (channels 400-899) when the AM-1958/GRC is used. The output signal of V1 is applied to mixer V2 an heterodyned with the frequency-modulated 50-mc input signal. The difference frequency (601.5 through 999.5 mc or 1350.5 through 1849.5 mc) at the output circuit of V2 is selected as the modulated rf carrier, amplified by amplifier V3, and applied through the transmit side of duplexer Z5 and directional coupler DC1 to the antenna. The rf carrier is also sampled at directional coupler DC1 and applied to the afc mixer in afc cavity Z1.

(2) Part of the energy from oscillator V1 and amplifier V3 in the amplifier-oscillator is routed through attenuator AT1 and filter FL1 to wavemeter Z6, where it is detected as the OSC or OUT FREQ (using the wavemeter). The wavemeter output is supplied to the metering

circuit and monitored when the transmitter is tuned.

(3) Reflected and forward rf power is measured at directional coupler DC1 (using the metering circuit) to determine the standing wave ratio existing on the antenna transmission line. A forward power sample is also routed from DC1 to low power alarm circuit V1 on the mainframe. The low power alarm circuit continuously monitors the transmitted power level, and causes the LOW POWER lamp to light and the alarm buzzer to sound if the transmitted power falls below a predetermined level.

d. Afc Assembly 2A4.

(1) Crystal oscillator V6 in afc assembly 2A4 generates a 2-mc signal which is shaped by blocking oscillator V7A and amplified by spectrum amplifier V7B. The output of V7B is routed out of afc assembly 2A4 to the harmonic generator in afc cavity Z1, where harmonics and cross-modulation products of the spectrum signal are generated and coupled to the tunable cavity. A reference signal of the required frequency is extracted from the tunable cavity and applied to the afc mixer. The reference signal is heterodyned with the rf carrier in the afc mixer and a 20.5 mc if. signal is produced and routed through if. amplifiers V1, V2, and V3 in afc assembly 2A4.

(2) The amplified output of V3 is shaped by limiter V4 and applied to the discriminator (T4, CR4, and CR5). If the rf carrier drifts off frequency, the if. signal (output of the afc mixer in Z1) changes to a frequency above or below 20.5 mc, a proportional dc output is produced by the discriminator. The discriminator output (error voltage) is shaped by modulator V8, amplified by motor driver feedback amplifier V9, and applied through AFC TUNE-ODD-EVEN switch S5 (on the mainframe) to afc motor B1 in modulator assembly 2A5.

(3) The error voltage causes rotation of B1 which, in turn, changes the operating frequency of 50-mc oscillator V2 to correct the off-frequency condition sensed at the output of the T-893(P)/GRC. The discriminator output is also routed to afc meter M2 on the frame where it provides a visual indication of afc action. The discriminator output (coupled through cathode follower V5A) and the output of V3 (afc level) are supplied to the meter circuit for monitoring purposes.

e. Regulator Assembly 2A6. Current overloads which could damage the circuits of V1, V2, and V3 in the amplifier-oscillator are prevented by use of transistorized regulator circuits Q1 through Q6 in regulator assembly 2A6.

Section III. POWER SUPPLY PP-2054/GRC

7. General

Power Supply PP-2054/GRC applies unregulated dc outputs of +800, +650, +645, and +360 volts, and regulated dc outputs of +250, +150, and +105 volts to the T-893(P)/GRC. The PP-2054/GRC also provides a straight through connection for the 115-volt ac for the filaments and blowers.

8. Power Distribution (fig. 2)

a. Primary power is applied to the power supply circuits through circuit breaker CB1. This circuit breaker provides overload protection (12.5 amperes) as well as primary power control. When CB1 is closed, primary power is applied to the following points:

(1) High voltage transformer T1.

(2) Low voltage transformer T2.

(3) Filament and power transformer T3.

(4) Power supply for blower B1.

(5) Main frame of T-893(P)/GRC for distribution in that component.

b. Primary power is applied to the fused primary windings of high voltage transformer T1 and low voltage transformer T2. The secondary winding of T1 is connected to bridge rectifier CR1 through CR12, which converts the applied ac voltage to dc. Unregulated dc voltages of +800, +650, and +645 volts are provided by the high-voltage circuits. The secondary winding of T2 is connected to bridge rectifier CR13 through CR20, which converts the applied ac voltage to +360 volts dc, unregulated.

c. Series regulator V1A and V2, dc amplifier V3, and reference tube V4 constitute a regulating circuit (operating from the unregulated +360-volt dc output) which provides a regulated dc output of +250 volts. Series regulator V1B and reference tube V5 operate from the regulated +250-volt dc output to provide additional regulated outputs of +150 and +105 volts dc.

d. The secondary winding of T3 provides filament voltage for the power supply tubes, and applies an isolated 115-volt ac potential to the power control and interlock circuit relays K1, K2, and K3, and switch S1.

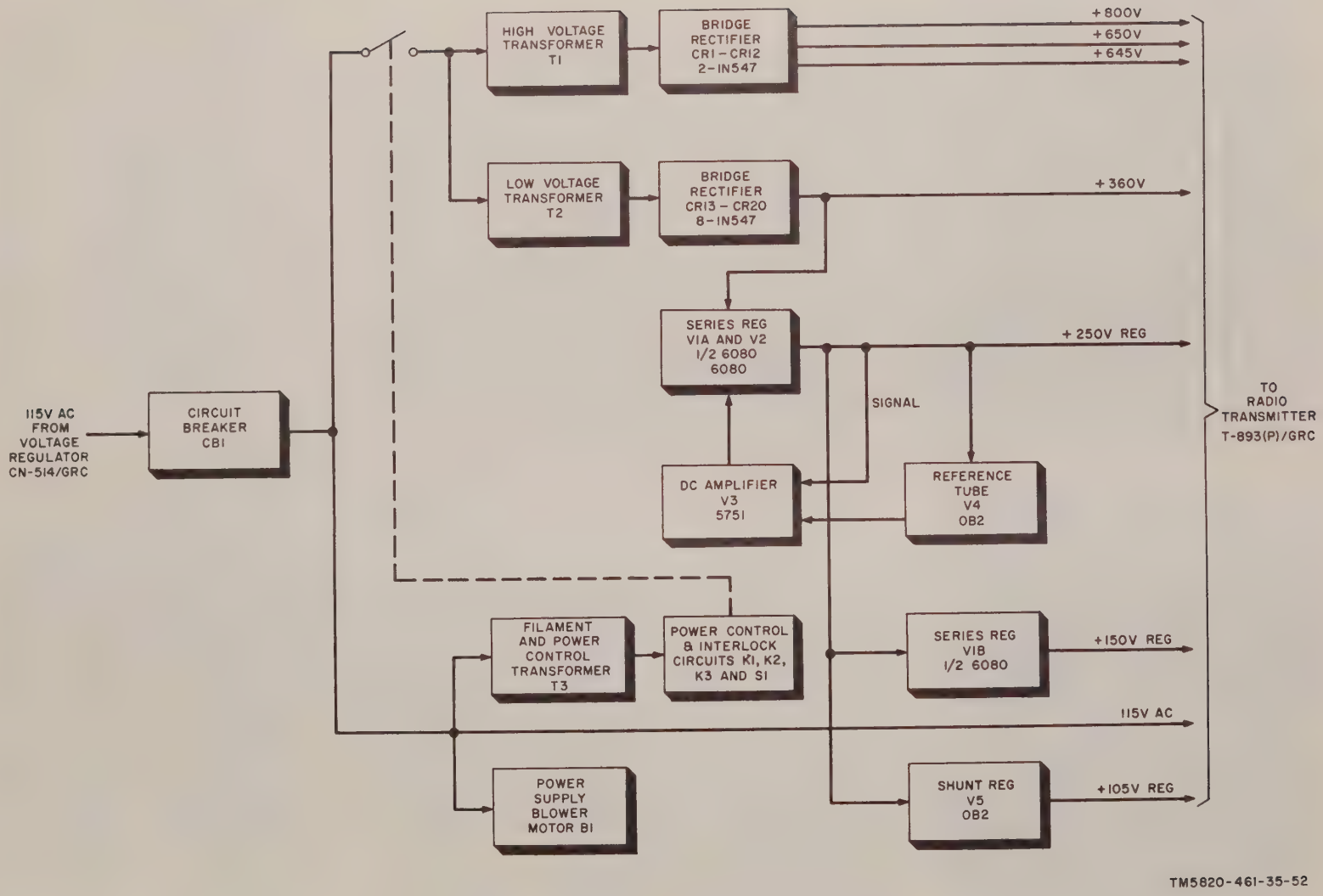


Figure 2. Power Supply PP-2054/GRC, block diagram.

9. General

Twelve channel pcm, or 4, 12, or 24 channel fdm signals, and order-wire communication can be received on Radio Receiver R-1148(P)/GRC. The R-1148(P)/GRC detects and amplifies the signals and distributes them to their appropriate terminations (handset, multiplex equipment, etc).

a. The R-1148(P)/GRC is used with Amplifier-Converter AM-1955/GRC or Amplifer-Converter AM-1956/GRC. When the AM-1955/GRC (low-band amplifier converter) is used, the frequency range is from 601.5 mc through 999.5 mc (channels 1-399). When the AM-1956/GRC (high-band amplifier converter) is used, the frequency range is from 1350.5 mc through 1849.5 mc (channels 400-899). The operating frequency is continuously tunable through the full range of each amplifier converter, permitting use of a total 899 traffic channels in the two operational bands.

b. The R-1148(P)/GRC includes the components and plug-in assemblies illustrated in figure 32.

10. Receiver Signal Paths
(fig. 32)

The signal paths through the R-1148(P)/GRC are identical with either amplifier converter installed (high-band or low-band operation).

a. Amplifier Converter Assembly 3A1 or 3A2 (AM-1955/GRC or AM-1956/GRC).

(1) Incoming signals received at the antenna are applied to the duplexer in the AM-1957/GRC or AM-1958/GRC in the T-893(P)/GRC. These signals are coupled from the duplexer through a coaxial cable to input of AM-1955/GRC or AM-1956/GRC. The input signals are applied through low-pass filter FL1, tunable filter Z1, to the crystal mixer and mixed with the output of the local oscillator to produce an intermediate frequency of 60 mc.

(2) The output of the crystal mixer CR1 is amplified by first if. assembly 3A1A1/3A2A1 (V1, V2, and V3) and connected through a coaxial cable to second if. assembly 3A5.

b. Second If. Assembly 3A5. The 60-mc if. signal is converted to 17 mc in the mixer stage and shaped by filter FL1 and amplified by V2 through V5. The signal is then limited by V6 and V7, amplified by V8, and applied to discriminator T5, which detects the pcm or fdm signal. The detected signal is then applied through video amplifier V9A, and cathode follower V9B, and squelch relay K1 to baseband assembly 3A3. A squelch circuit in this assembly is controlled by the level of the 17-mc signal. When the signal level falls below a predetermined level, the squelch circuit disconnects the output signal from receiver baseband assembly 3A3. At the same time, an alarm circuit provides an audible and visual indication of faulty operation of the equipment to the local operator.

c. Baseband Assembly 3A3. The pcm or fdm and order wire signals are amplified by separate channel amplifiers in the baseband assembly 3A3. The pcm channel consists of V1A, FL1, V2A, V2B, and V3 with V4 as a metering amplifier. The fdm channel consists of V5A, V5B, V6 and impedance selector switch S8. The received order wire channel consists of V7A, FL2, V8A, and V8B. The other order wire channels from the T-893(P)/GRC baseband assembly 2A3 are applied directly to amplifier V7B.

d. Afc System. The afc system controls the frequency of the local oscillator in the AM-1955/GRC or AM-1956/GRC. The signal generated by local oscillator V1 (in amplifier converter assembly 3A1 or 3A2) is sampled and connected to afc assembly 3A4 where it is compared with a locally generated reference frequency and a correction signal is obtained. The afc correction signal is applied to a motor which in turn controls the local oscillator V1 frequency. The frequency of the 43-mc

oscillator V10, in the second if. assembly 3A5 is controlled by a secondary afc circuit. Any variation from the 17-mc second if. frequency produces a dc error signal at discrimator T5. This error signal is applied to the 43-mc oscillator to maintain the oscillator at the proper frequency.

e. Main Frame. The main frame contains the power supply which supplies all the necessary dc and filament voltages, the metering circuit, and a signaling unit.

f. Signaling Unit 3A6. Signaling unit 3A6 contains a test tone oscillator, a ringing tone oscillator, and a ring tone detector which detects a ring tone on the order wire channel.

Section V. VOLTAGE REGULATOR CN-514/GRC

11. General
(fig. 42)

a. Voltage Regulator CN-514/GRC provides a regulated output of 115 volts ac to PP-2054/GRC and R-1148(P)/GRC at a maximum capacity of 5 kva (kilovolt-amperes). The CN-514/GRC employs a buck-boost circuit and an automatic reference circuit (sensor and regulator circuits) to maintain a regulated output over input voltages that can vary from 95 to 135 volts.

b. The main frame of CN-514/GRC provides mounting for front panel controls, the metering circuit, input- and output-power connectors, and the buck-boost circuits. In addition, the frame provides mounting for control regulator A1 (plug-in assembly), which houses the reference and regulator circuits.

12. Power Regulating Action
(fig. 42)

a. Regulation is accomplished through controlled feedback. The input power is applied through POWER ON circuit breaker CB1 to the secondary of transformer T2 and across the winding of adjustable autotransformer T1. Transformer T1 governs the primary voltage of transformer T2 by means of a slider which is controlled (driven) by motor B1. This primary voltage in turn determines the amplitude of the output voltage. Motor B1 is energized by impulses from control regulator A1. The output voltage is sampled by transformer T1 (in control regulator A1) and applied to reference bridge A1. The output of A1 is applied to the primary of transformer T2. The secondary of T2 is connected to the grids of relay thyratrons V1 and V2, and, depending upon the output of reference bridge A1, will cause either V1 or V2 to conduct. (When the bridge is balanced, no voltage is applied to T2 and both V1 or V2 do not conduct.) When V1 or V2 conducts, center-off relay K1 is energized, the particular side dependent upon the conducting thyratron. Power is then supplied through contacts of relay K1 to motor B1 which, in turn, drives the slider on adjustable autotransformer T1 in the proper direction to compensate for a decrease or an increase in input voltage. When the output voltage has been returned to the preset level, the bridge (A1) is balanced, producing no output. This causes the relay thyratron to stop conducting, relay K1 deenergizes, and motor B1 stops.

Section VI. POWER CONTROL AND PROTECTIVE CIRCUITS

13. Power Control

a. Distribution of primary power, including the associated control and protective circuits, is shown in figure 29. Primary power (115 volts ac, single phase) is connected to Power Supply PP-2054/GRC at AC POWER connector J1 from Voltage Regulator CN-514/GRC. AC POWER circuit breaker CB1 provides protection against damage which could occur as the result of an overload. When PP-2054/GRC and T-893(P)/GRC are interconnected, application of primary power

(through fuse F3) to the component parts listed below is controlled by CB1.

(1) Power Supply PP-2054/GRC: Blower motor B1, filament and power control transformer T3, and FIL indicator lamp DS3.
(2) Main frame of T-893(P)/GRC: Filament transformers T1 and T2, and blower motor B1.
(3) Amplifier-Oscillator AM-1957/GRC or AM-1958/GRC: Filament transformer T1.
(4) Modulator Assembly 2A5 in T-893(P)/GRC: Afc motor B1.

b. When CB1 is positioned to ON, DS3 lights, and (assuming all interlocks are closed) an isolated 115 volts ac is transformer coupled through T3 to the heater (terminals 2 to 3) of time delay relay K2. Relay K2 is part of the low-voltage and high-voltage control circuit consisting of: transformer T3, relays K1, K2, and K3, and switch S1 in Power Supply PP-2054/GRC; interlock S6 in the main frame of T-893(P)/GRC; and thermal switch S1 in Amplifier-Oscillator AM-1957/GRC or AM-1958/GRC. Following a 75-second warm-up delay (initiated by closing CB1), contacts 5 and 7 of K2 close, completing a circuit from terminal 6 of relay K1 to terminal 6 of T3. If STANDBY-OPERATE switch S1 is placed in the OPERATE position at this time, K1 energizes.

c. Energizing K1 causes the following to occur:

(1) Application of primary power to low-voltage transformer T2 and high-voltage transformer T1.
(2) LV lamp DS2 and HV lamp DS1 to light.
(3) The removal of power from K2 heater.
(4) K1 to be locked on through holding contacts 5 and 7.
(5) Application of power (from T3) to the heater (terminals 2 to 3) of time-delay relay K3.

d. Removing power from the heater of K2 permits K2 contacts 5 and 7 to reopen; while application of power to the heater of K3 causes K3 contacts 5 and 7 to close, completing a circuit from terminal 6 of K1 to terminal 6 of T3.

e. T-893(P)/GRC operates through the sequence of events described in *b* through *d* above each time it is used, when starting from a down condition.

14. Protective Circuits
(fig. 41)

a. If primary power is lost for less than 6 seconds during normal operation, T-893(P)/GRC is automatically returned to an operational status because of the nonaction of K3 contacts (fig. 9). Contacts 5 and 7 of K3 require 6 seconds to open when power is removed from the heater.

b. If the temperature in Amplifier-Oscillator AM-1957/GRC or AM-1958/GRC rises to an excessive level, thermal switch S1 opens, causing K1 to deenergize. When K1 deenergizes, primary power is removed from low-voltage transformer T2 and high-voltage transformer T1, preventing damage to the circuits of Amplifier-Oscillator AM-1957/GRC or AM-1958/GRC.

c. Interlock S6 on the main frame of T-893(P)/GRC is mechanically closed when AM-1957/GRC or AM-1958/GRC is inserted into the main frame.

15. Alarm Circuits
(fig. 3)

a. Relay K1 in the T-893(P)/GRC is energized when the signal level is being transmitted at the correct level. If the signal falls below a predetermined level, relay K1 deenergizes and the following actions occur:

(1) 6.3 volts ac on pin 6 of K1 is applied through contact 8 to the alternate action BUZZER OFF switch S2, and through resistor R2 to the LOW POWER lamp DS1.
(2) Pushing switch S2 breaks the ac path to buzzer DS2 and turns the buzzer off. However, the lamp is a true indicator and remains lighted as long as K6 is deenergized. After power is restored, relay K1 energizes, the LOW POWER lamp DS1 goes out, and the buzzer sounds again because a circuit now exists from contacts 6

and 5 of K1, through S2, now in the depressed position. The BUZZER OFF pushbutton must be depressed again to turn off the buzzer. Note that the buzzer sounds on each change of power level and may be turned off to prevent annoyance.

b. At the same time as the action described in *a* above occurs, the other contacts of K1, 2 and 4, close to apply 6.3 volts ac through rectifier CR1 to provide a dc voltage to actuate alarm relay K2 on the main frame of Radio Receiver R-1148(P)/GRC. This alarm connection also acts exactly as the local alarm buzzer circuit, duplicating the alarm condition at the buzzer on R-1148(P)/GRC.

c. The alarm relay K2 in the frame of R-1148(P)/GRC may also be actuated by the action of the SQUELCH relay. With a loss of received signal, relay K1 on the second if. assembly closes and contacts 1 and 2 apply 6.3 volts through rectifier CR1 to the coil of alarm relay K2. Also the NO SIGNAL lamp DS2 is illuminated.

(1) Contacts 1 and 2 close to turn on the 1600 cps ring oscillator which operates a remote alarm on the two wire line by ringing that phone.

(2) Contacts 8 and 14 open to prevent the ring signal just applied to local order wire circuitry from being transmitted.

(3) Contacts 10 and 11 operate the local buzzer DS4 through the BUZZER OFF switch in the same manner as the corresponding switch on T-893(P)/GRC.

d. If a true ring signal is detected on the order-wire circuit by the ring signal detector in signaling unit 3A6, the output also energizes the buzzer DS4 and lights the INCOMING CALL lamp.

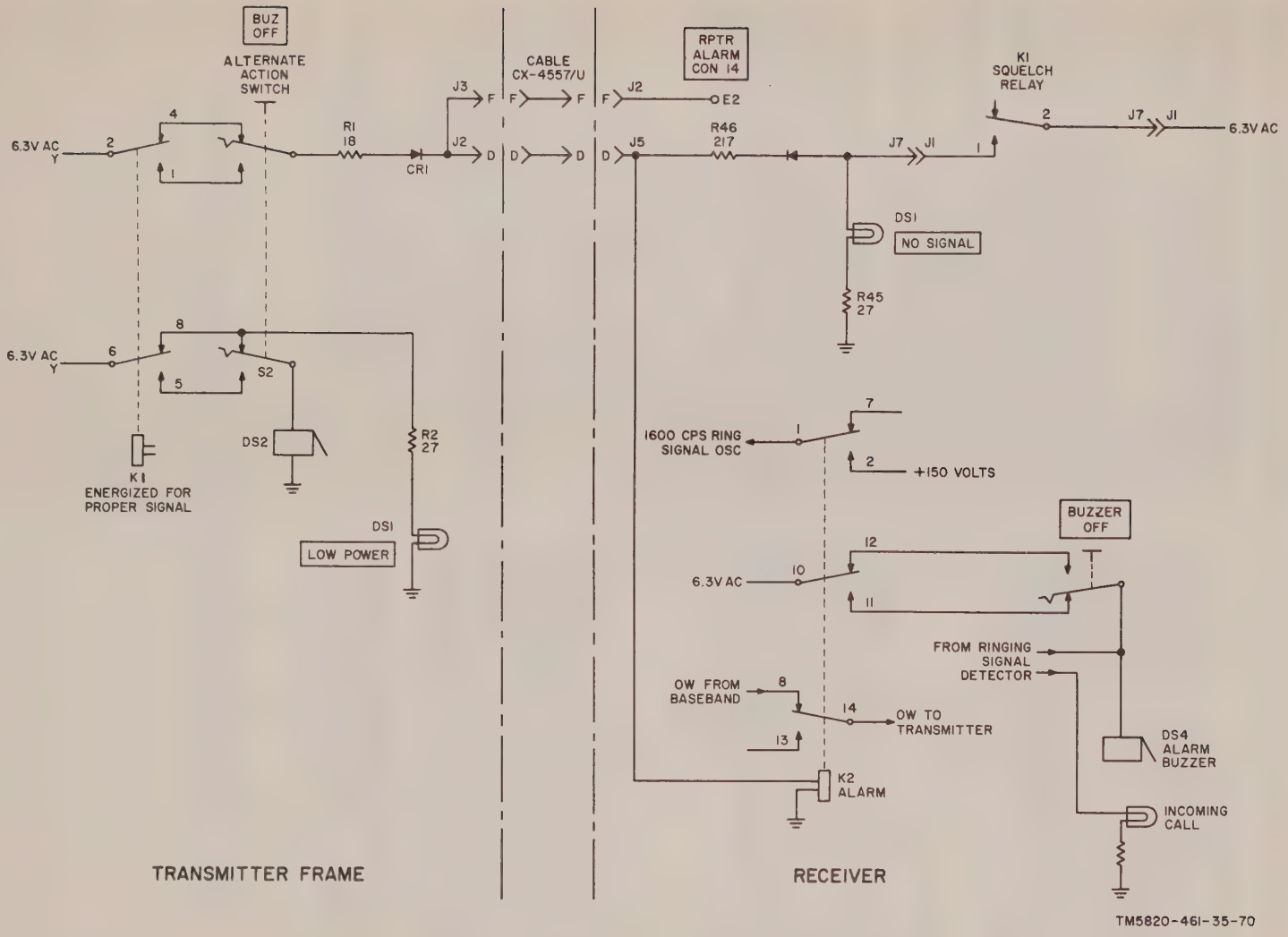


Figure 3. Alarm circuit, signal interconnection diagram.

CHAPTER 3

REPAIRS

16. General Instructions

The repair data in this manual supplements the sectionalizing procedures in TM 11-5820-461-20. When the trouble is sectionalized to a defective major component refer to the appropriate schematic diagram and voltage and resistance illustration to aid in localizing the defective component.

17. Repair Procedures

When any of the major components of the radio set are removed from the equipment cases, cables must be fabricated to apply power and operating potentials to the components. Refer to figures 4 through 10 for the appropriate cable fabrication instructions.

18. Internal Test Facilities

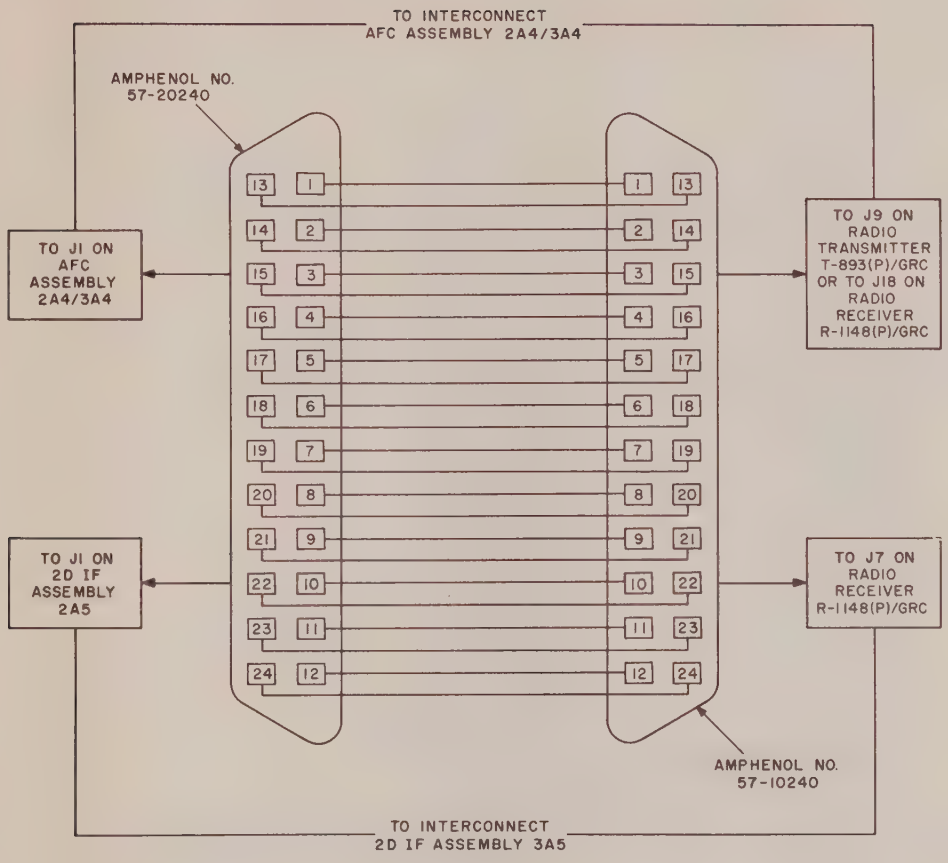
a. Test Tone. A 1-kc test tone generated in the signalling unit of the receiver may also be connected into the transmitter baseband assembly when a check of deviation is desired. The 1-kc tone is applied to the grid circuit of V1A through pin 8 of connector J1 and an L pad consisting of R8 and R7.

b. Test Points on Baseband Assembly 2A3. The test points listed below are located in baseband assembly 2A3 and permit measurement of various signals during maintenance procedures:

Test point	Function
J4	Provides an oscilloscope or test vtvm connection to measure pcm input signal.
J5	Provides an oscilloscope or test vtvm connection to measure composite signal input to modulator.
J6	Provides connection for measurement of order wire input.
J7	Provides connection for check of 250-volt supply using meter M1 on the front panel.
J8	Ground connection for test equipment.

c. Test Points on Modulator Assembly 2A5. Five test points are provided on modulator assembly 2A5 for maintenance purposes. The functions of the test points are listed below:

Test point	Function
J4	Provides connection for measurement of +105-volt supply with metering circuit.
J6	Provides connection for measurement of +250-volt supply with metering circuit.
J7	Provides connection for measurement of +360-volt supply with metering circuit.
J3	Provides connection of external test equipment for measurement of composite baseband signal input to modulator assembly 2A5.
J5	Provides connection of external test equipment for measurement of the output of modulator assembly 2A5.



NOTE: USE A.W.G. NO. 18 WIRE FOR INTERCONNECTIONS.
LENGTH BETWEEN CONNECTORS IS 36 INCHES.

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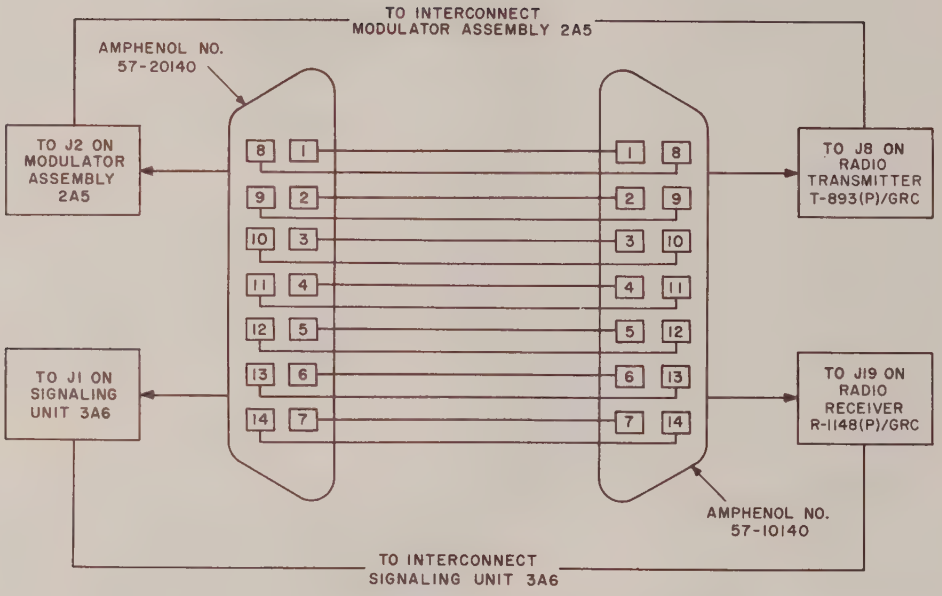
Figure 4. Cable fabrication for interconnection of afc assembly 2A4/3A4 to R-1148(P)/GRC, or T-893(P)/GRC, and second if. assembly 3A5 to R-1148(P)/GRC.



NOTE: USE A.W.G. NO. 18 WIRE FOR INTERCONNECTIONS.
LENGTH BETWEEN CONNECTORS IS 36 INCHES.

TM5820-461-35-18

Figure 5. Cable fabrication for interconnection of modulator assembly 2A5 to T-893(P)/GRC, and signalling unit 3A6 to R-1148(P)/GRC.

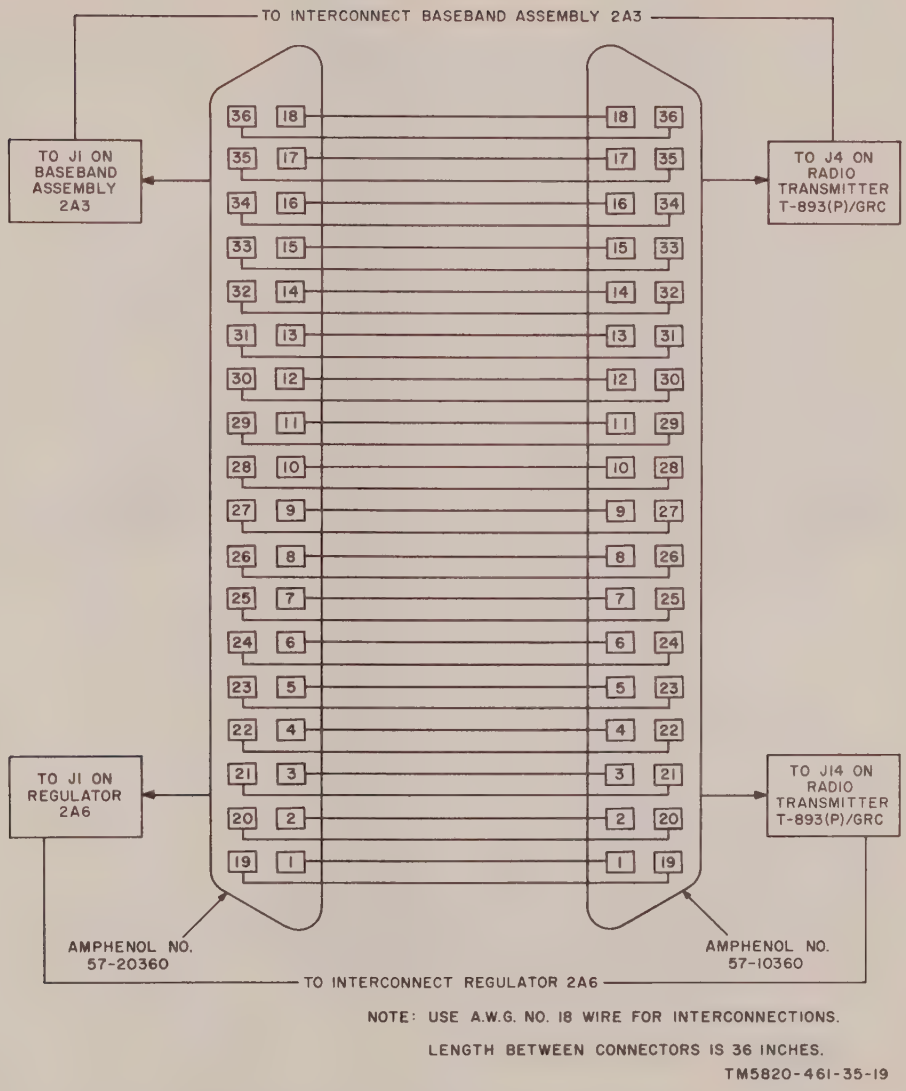

TO INTERCONNECT BASEBAND ASSEMBLY 2A3
TO J1 ON BASEBAND ASSEMBLY 2A3
TO J4 ON RADIO TRANSMITTER T-893(P)/GRC
TO J1 ON REGULATOR 2A6
TO J14 ON RADIO TRANSMITTER T-893(P)/GRC
AMPHENOL NO. 57-20360
AMPHENOL NO. 57-10360
TO INTERCONNECT REGULATOR 2A6
NOTE: USE A.W.G. NO. 18 WIRE FOR INTERCONNECTIONS.
LENGTH BETWEEN CONNECTORS IS 36 INCHES.
TM5820-461-35-19

Figure 6. Cable fabrication for interconnection of baseband assembly 2A3 and regulator assembly 2A6 to T-893(P)/GRC.

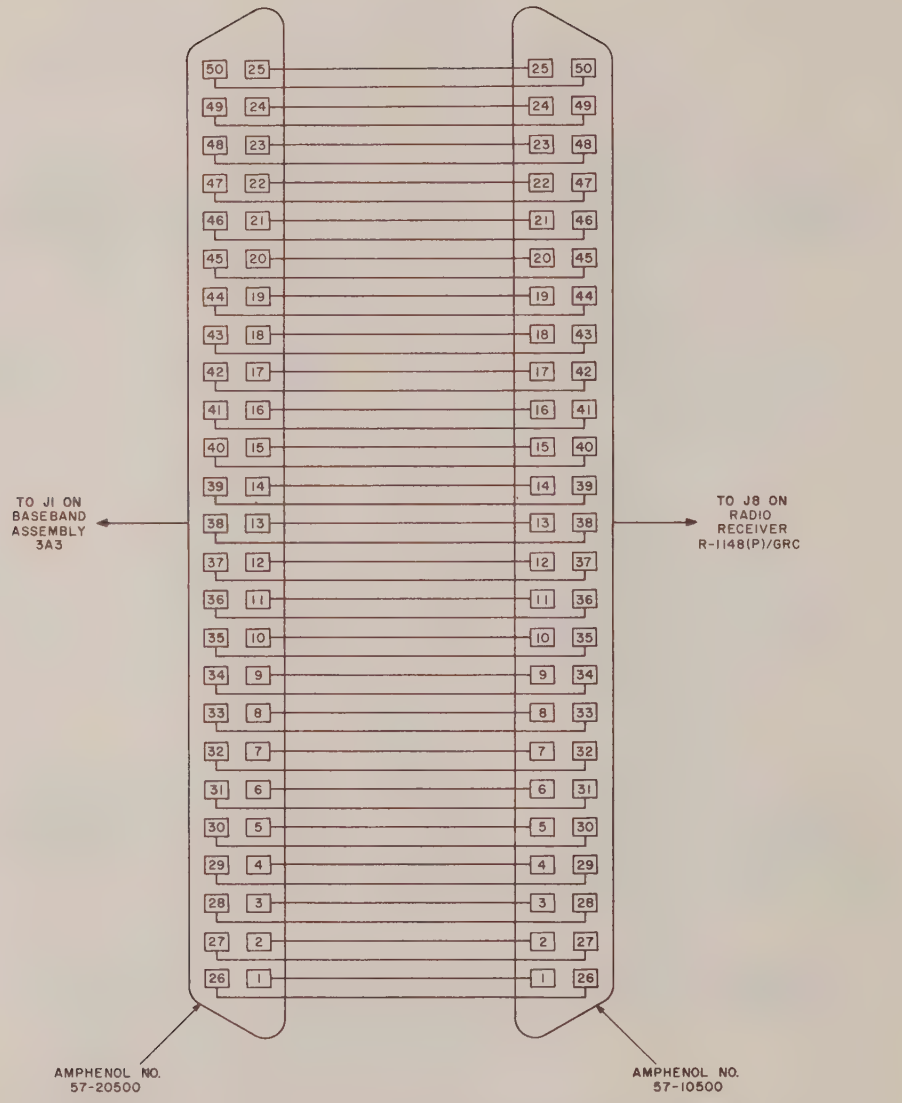

TO J1 ON BASEBAND ASSEMBLY 3A3
TO J8 ON RADIO RECEIVER R-1148(P)/GRC
AMPHENOL NO. 57-20500
AMPHENOL NO. 57-10500
NOTE: USE A.W.G. NO. 18 WIRE FOR INTERCONNECTIONS.
LENGTH BETWEEN CONNECTORS IS 36 INCHES.
TM5820-461-35-20

Figure 7. Cable fabrication for interconnection of baseband assembly 3A3 to R-1148(P)/GRC.

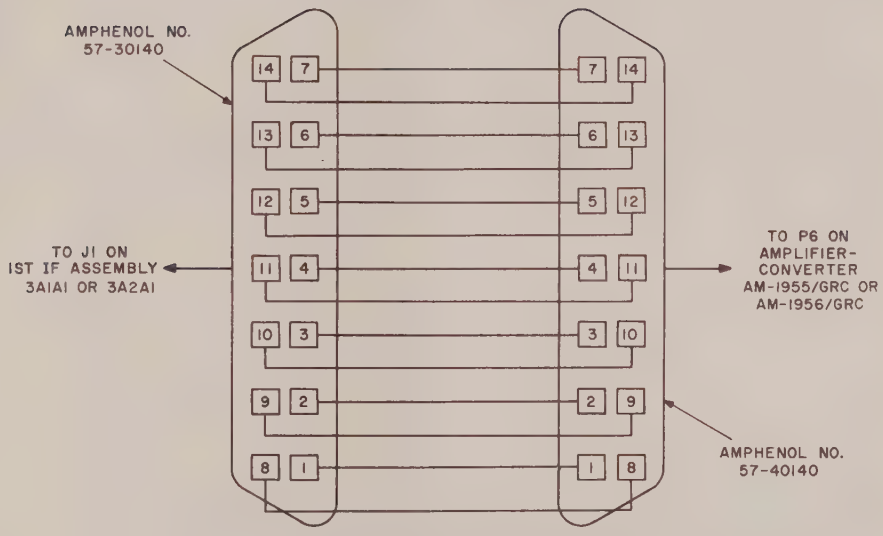
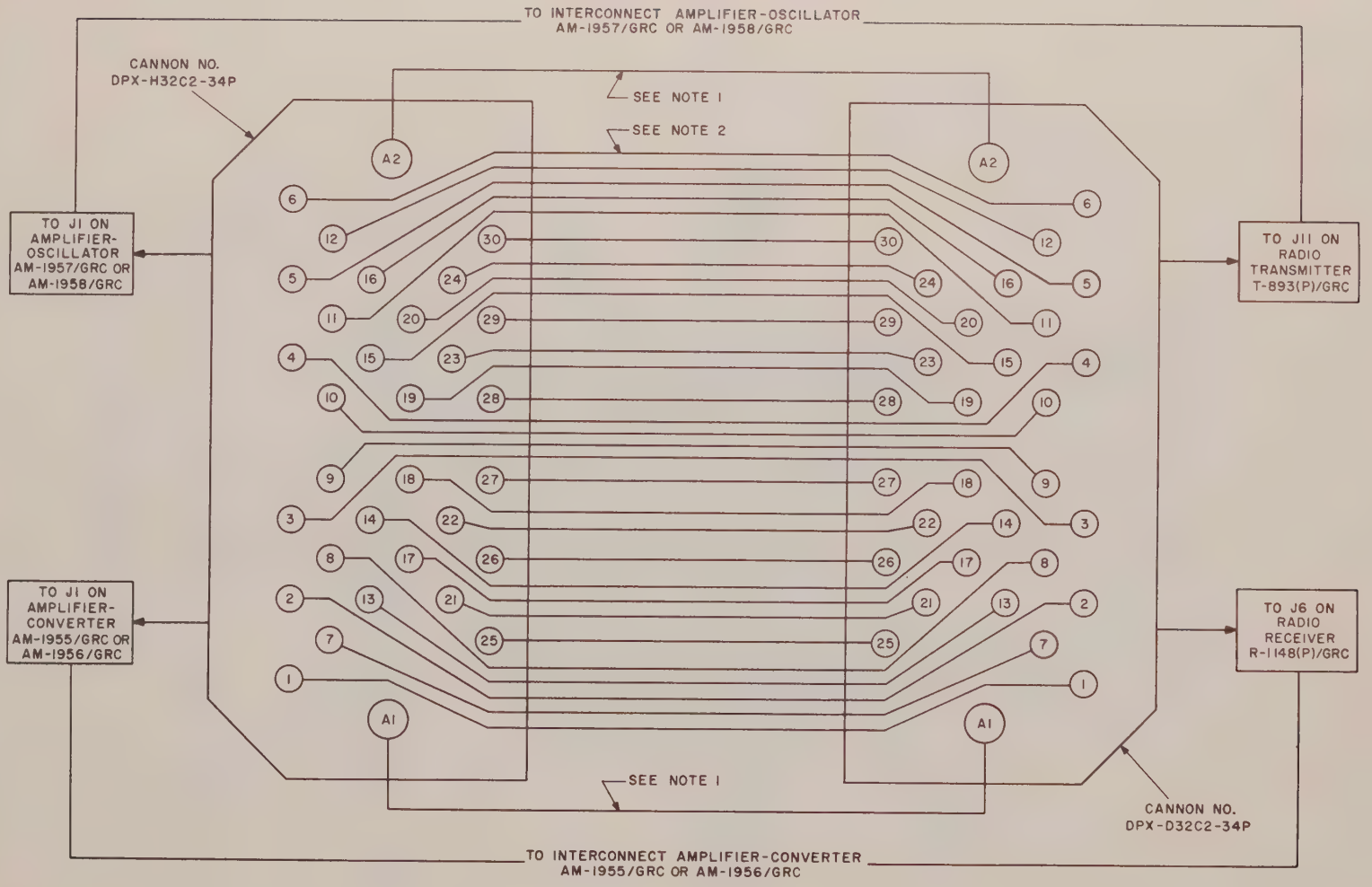


Figure 8. Cable fabrication for interconnection of first if. assembly 2A1A1/ 3A1A1 to AM-1955/GRC or AM-1956/GRC.



NOTES:

1. FABRICATE RG-223/U ASSEMBLY
2. USE A.W.G. NO. 18 WIRE FOR ALL INTERCONNECTIONS EXCEPT A1 AND A2
3. LENGTH BETWEEN CONNECTORS IS 24 INCHES.

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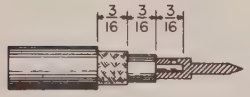
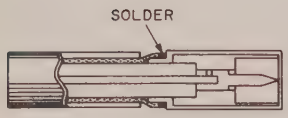
Figure 9. Cable fabrication for interconnection of AM-1957/GRC or AM-1958/GRC to T-893(P)/GRC, and AM-1955/GRC or AM-1956/GRC to R-1148(P)/GRC.

TO CANNON PLUG NO. DPX-H32C2-34P

CUT RG-223/U CABLE TO DESIRED LENGTH AND STRIP OFF VINYL JACKET 9/16". FLARE BRAID SLIGHTLY TO PERMIT TRIMMING.



CUT BRAID TO EXPOSE 3/8" OF THE DIELECTRIC. CUT DIELECTRIC TO EXPOSE 3/16" OF THE CONDUCTOR. SLIP CONTACT ONTO CONDUCTOR AND SOLDER THROUGH THE CROSS DRILLED HOLE. USE CARE TO PREVENT SOLDER DEPOSIT ON OUTSIDE SURFACES OF CONTACT. DO NOT OVERHEAT DIELECTRIC AS IT WILL DISTORT AND MAKE ASSEMBLY INTO SHELL DIFFICULT.

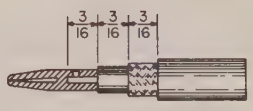


THE CONNECTOR SHELL SHOULD BE SLIPPED ONTO THE CABLE. THE BRAID SHOULD BE FLARED SLIGHTLY TO PERMIT THE SHELL TO GO UNDER THE BRAID. SOLDER THE SHELL TO THE BRAID AS SHOWN. DO NOT APPLY EXCESSIVE HEAT OR DIELECTRIC WILL BE DISTORTED.

TO CANNON PLUG NO. DPX-D32C2-34P

CUT RG-223/U CABLE TO DESIRED LENGTH AND STRIP OFF VINYL JACKET 9/16". FLARE BRAID SLIGHTLY TO PERMIT TRIMMING.

CUT BRAID TO EXPOSE 3/8" OF THE DIELECTRIC. CUT DIELECTRIC TO EXPOSE 3/16" OF THE CONDUCTOR. SLIP CONTACT ONTO CONDUCTOR AND SOLDER THROUGH THE CROSS DRILLED HOLE. USE CARE TO PREVENT SOLDER DEPOSIT ON OUTSIDE SURFACES OF CONTACT. DO NOT OVERHEAT DIELECTRIC AS IT WILL DISTORT AND MAKE ASSEMBLY INTO A1 OR A2 DIFFICULT.



THE COMPLETED CABLE SHOULD BE SLIPPED INTO A1 OR A2. THE BRAID SHOULD BE FLARED SLIGHTLY TO PERMIT THE SHELL OF A1 OR A2 TO GO UNDER THE BRAID. SOLDER THE SHELL TO THE BRAID AS SHOWN. DO NOT APPLY EXCESSIVE HEAT OR DIELECTRIC WILL BE DISTORTED.

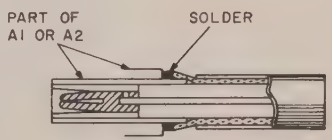


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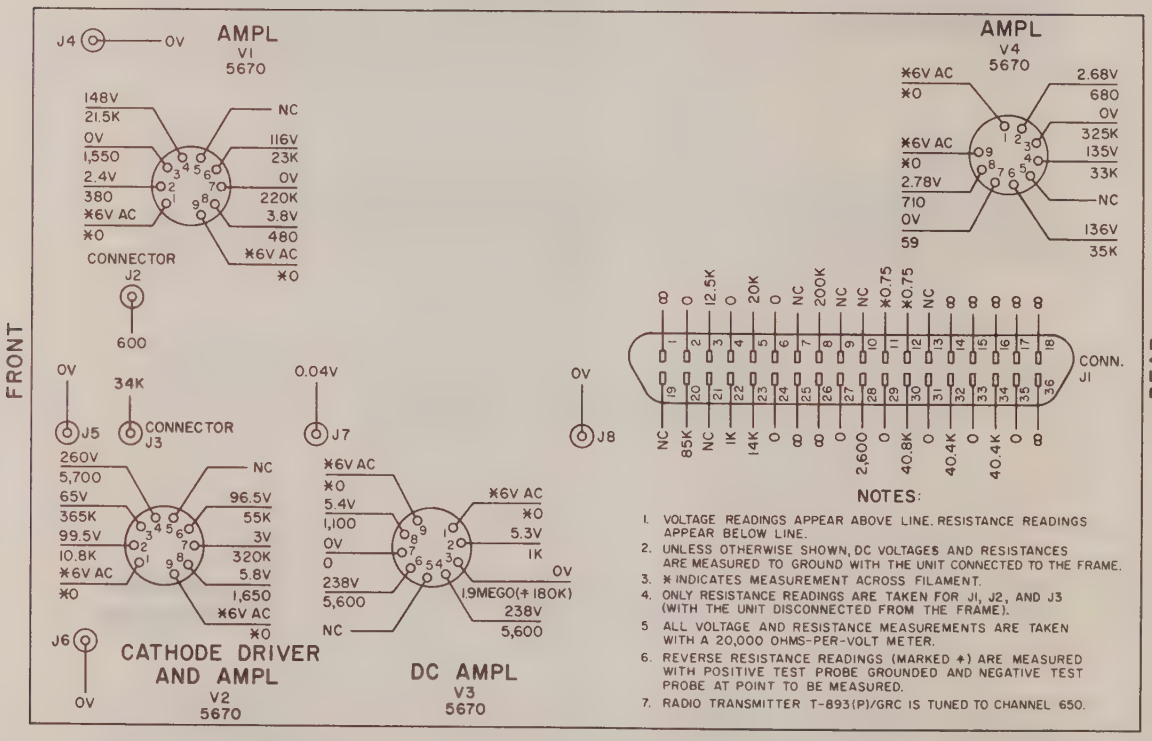
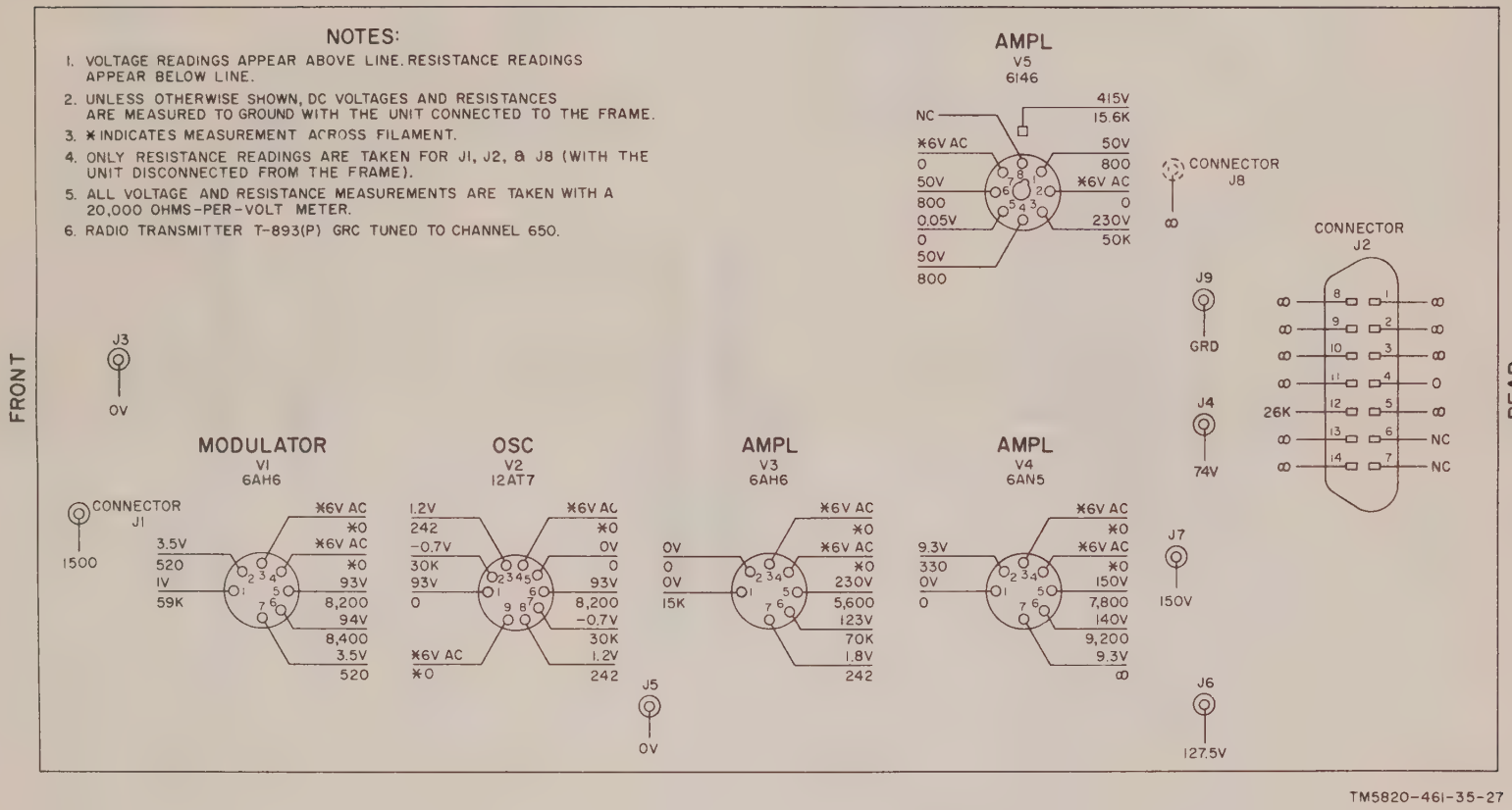
Figure 10. Fabrication of RG-223/U assembly.



TM5820-461-35-25

Figure 11. Baseband assembly 2A3, voltage and resistance diagram.



TM5820-461-35-27

Figure 12. Modulator assembly 2A5, voltage and resistance diagram.

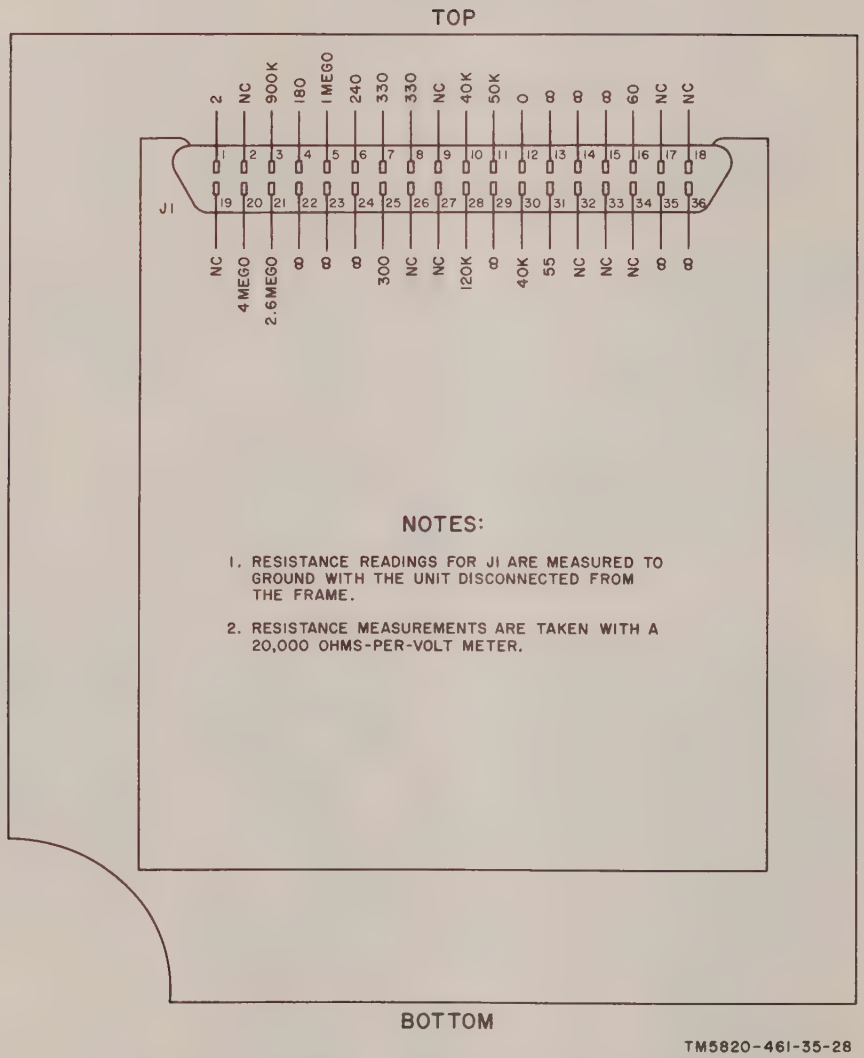


Figure 13. Regulator assembly 2A6, resistance diagram.

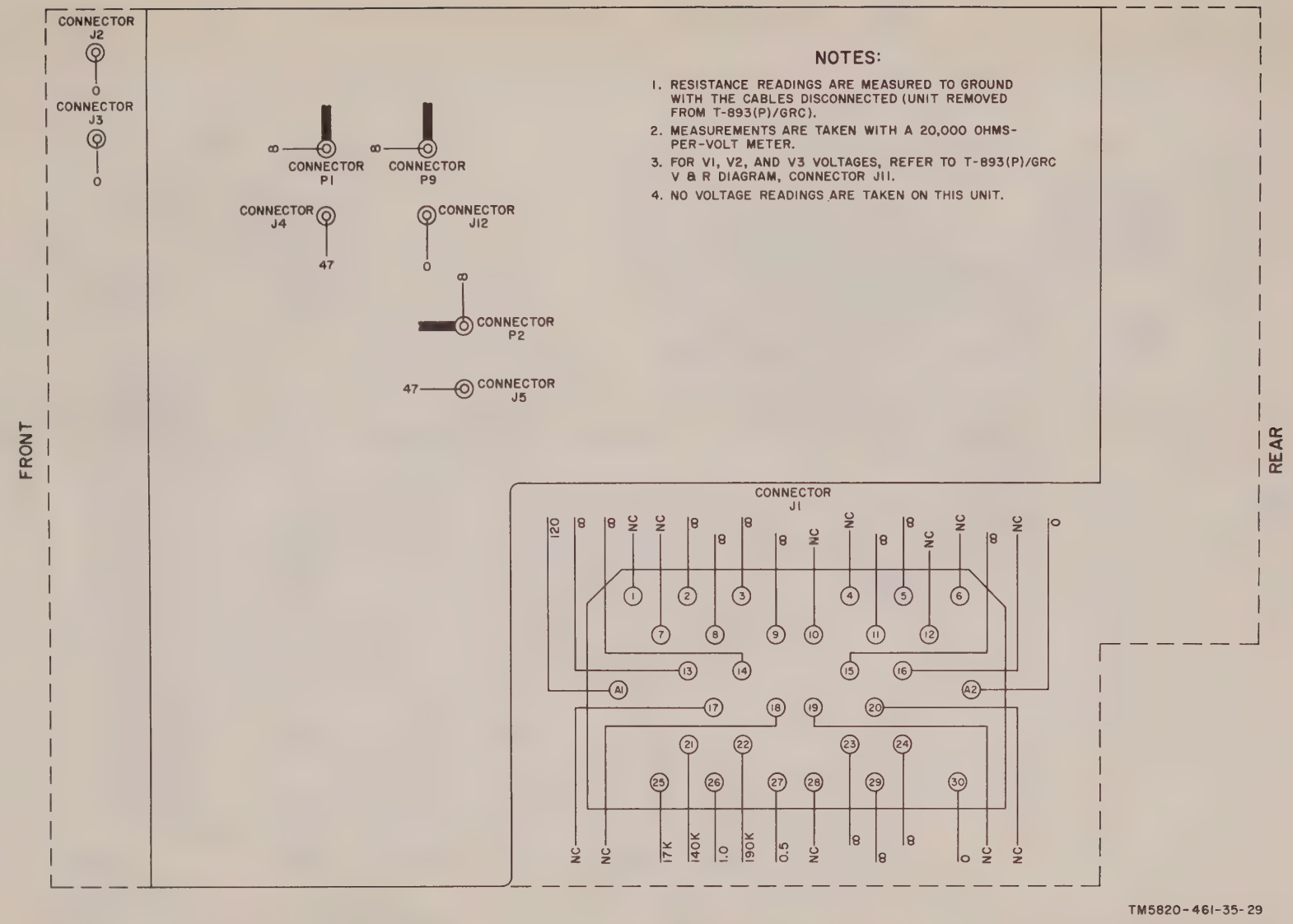


Figure 14. Amplifier-Oscillator AM-1957/GRC and AM-1958/GRC, resistance diagram.

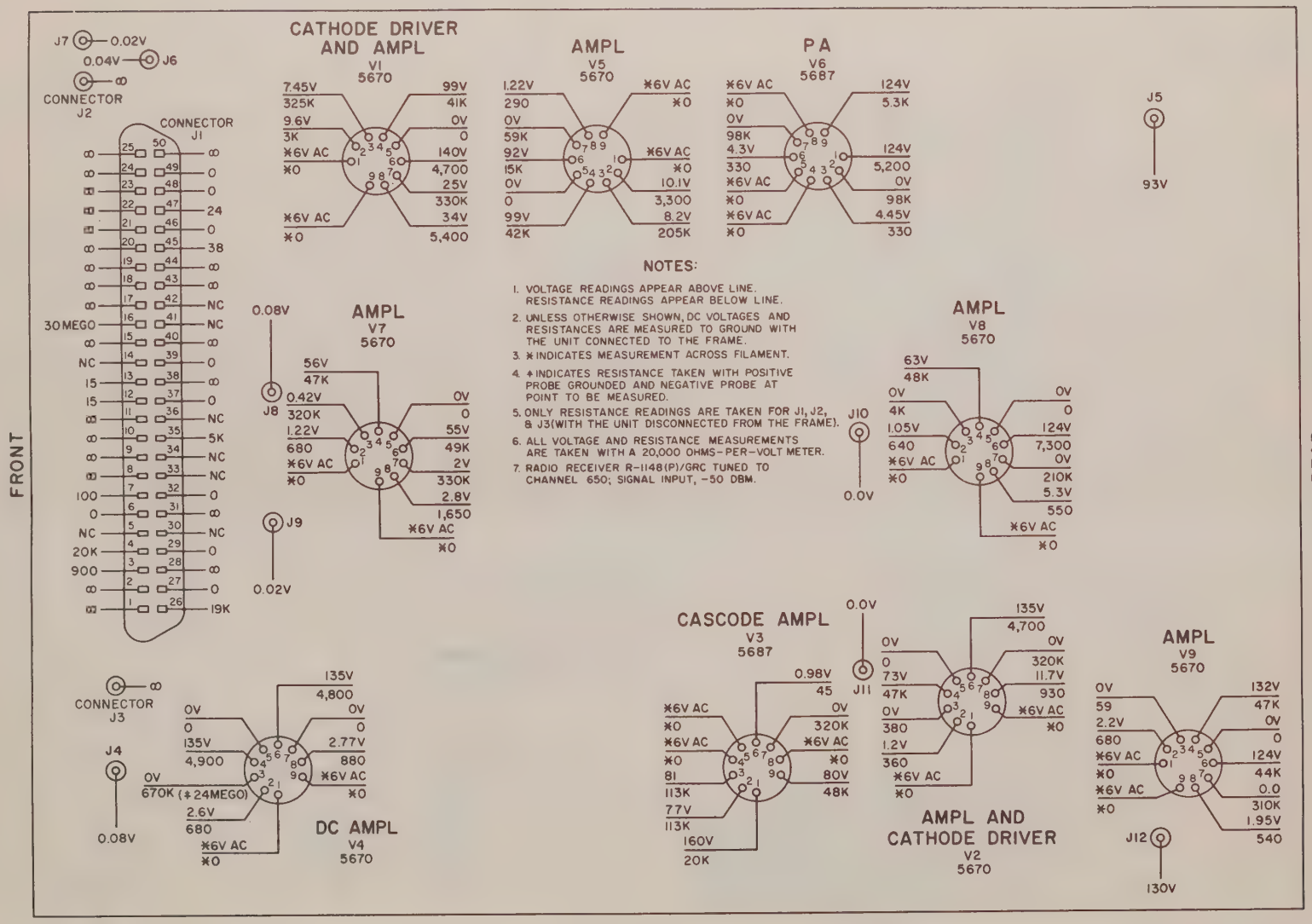


Figure 15. Baseband assembly 3A3, voltage and resistance diagram.

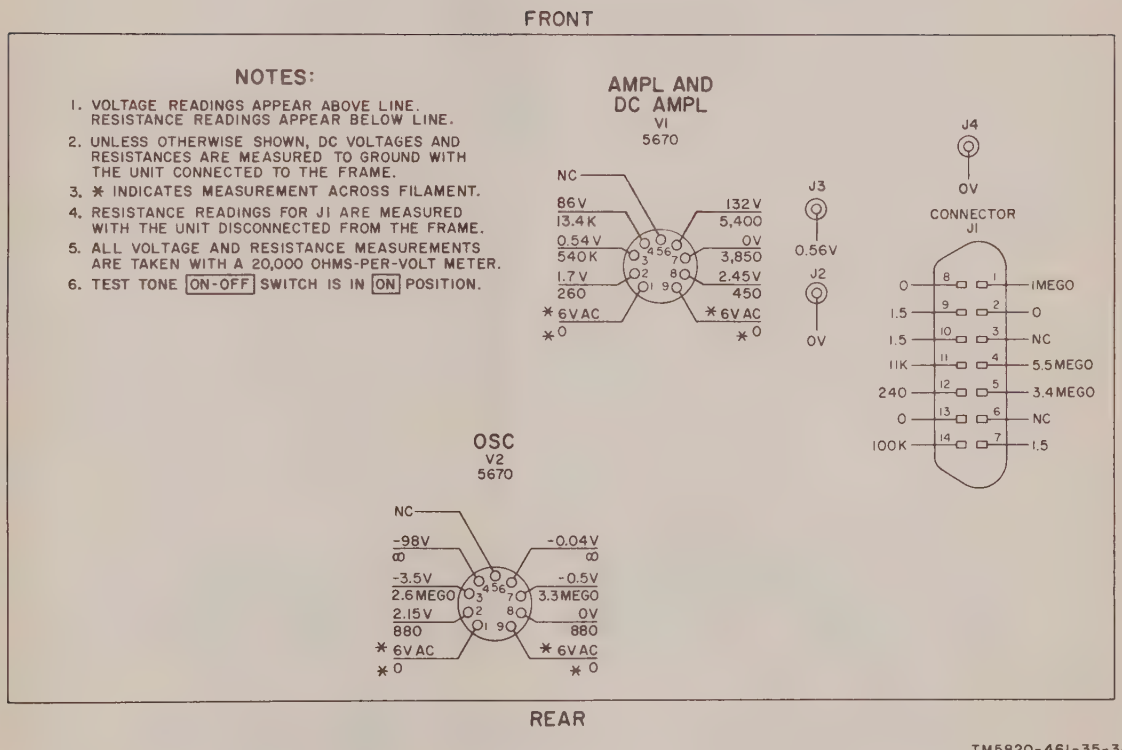


Figure 16. Signalling unit 3A6, voltage and resistance diagram.

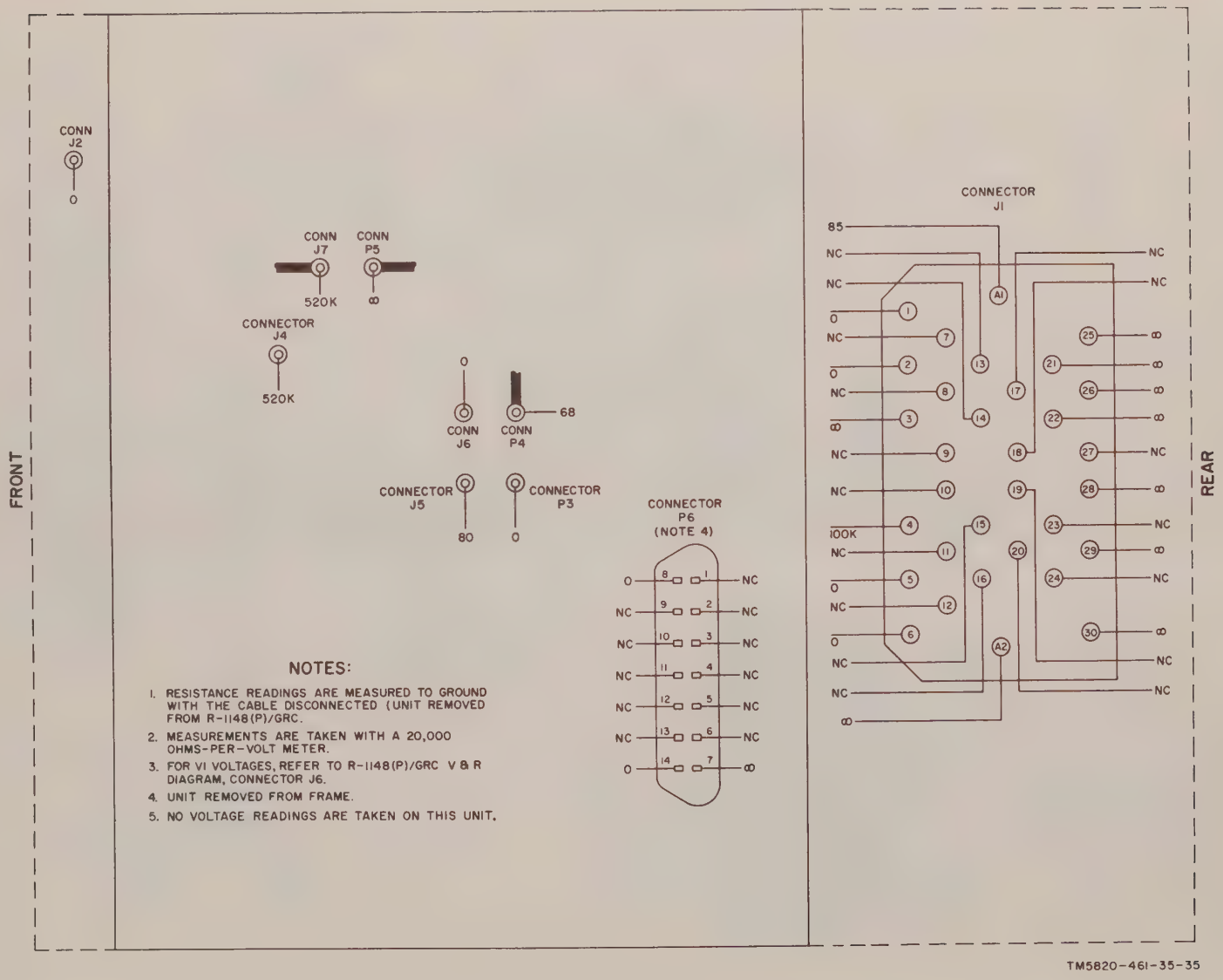
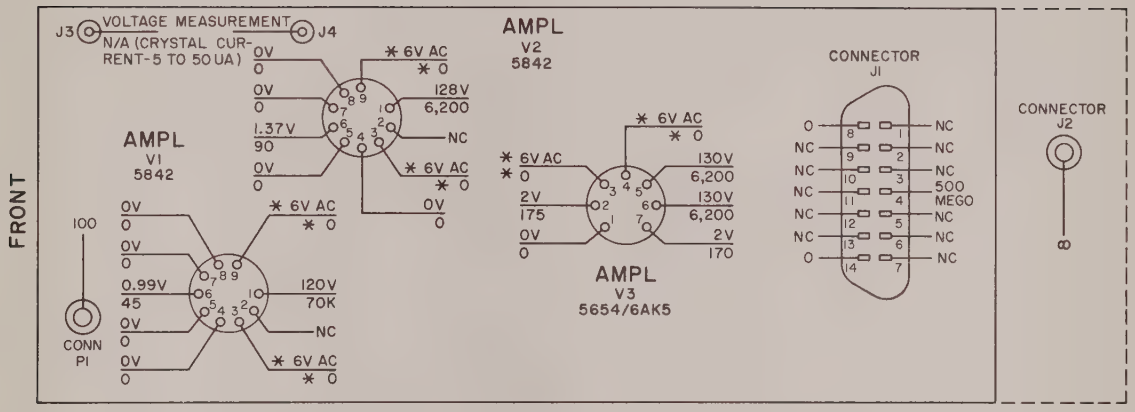


Figure 17. Amplifier-Converter AM-1955/GRC and AM-1956/GRC.



NOTES:

1. VOLTAGE READINGS APPEAR ABOVE LINE. RESISTANCE READINGS APPEAR BELOW LINE.
2. UNLESS OTHERWISE SHOWN, DC VOLTAGES AND RESISTANCES ARE MEASURED TO GROUND WITH THE UNIT CONNECTED TO THE FRAME.
3. * INDICATES MEASUREMENT ACROSS FILAMENT.
4. ONLY RESISTANCE READINGS ARE TAKEN FOR J1, J2, & P1 (WITH THE UNIT DISCONNECTED FROM THE FRAME).
5. ALL VOLTAGE AND RESISTANCE MEASUREMENTS ARE TAKEN WITH A 20,000 OHMS-PER-VOLT METER.
6. RADIO RECEIVER R-1148(P)/GRC TUNED TO CHANNEL 650; SIGNAL INPUT, −50 DBM.

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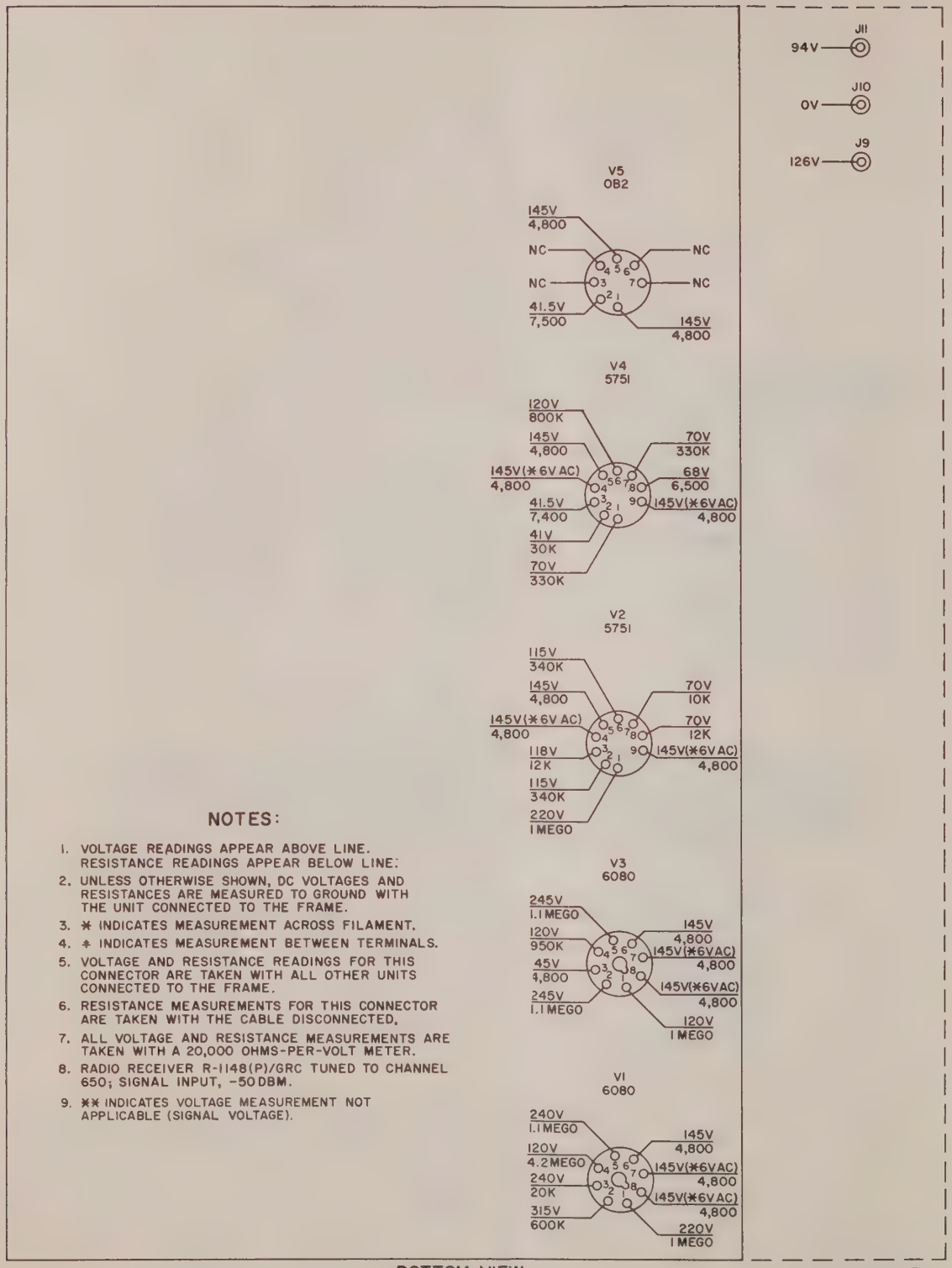
Figure 18. First if. assembly 3A1A1/3A2A1, voltage and resistance diagram.



NOTES:

1. VOLTAGE READINGS APPEAR ABOVE LINE. RESISTANCE READINGS APPEAR BELOW LINE.
2. UNLESS OTHERWISE SHOWN, DC VOLTAGES AND RESISTANCES ARE MEASURED TO GROUND WITH THE UNIT CONNECTED TO THE FRAME.
3. * INDICATES MEASUREMENT ACROSS FILAMENT.
4. ± INDICATES MEASUREMENT BETWEEN TERMINALS.
5. VOLTAGE AND RESISTANCE READINGS FOR THIS CONNECTOR ARE TAKEN WITH ALL OTHER UNITS CONNECTED TO THE FRAME.
6. RESISTANCE MEASUREMENTS FOR THIS CONNECTOR ARE TAKEN WITH THE CABLE DISCONNECTED.
7. ALL VOLTAGE AND RESISTANCE MEASUREMENTS ARE TAKEN WITH A 20,000 OHMS-PER-VOLT METER.
8. RADIO RECEIVER R-1148(P)/GRC TUNED TO CHANNEL 650; SIGNAL INPUT, -50 DBM.
9. ** INDICATES VOLTAGE MEASUREMENT NOT APPLICABLE (SIGNAL VOLTAGE).

Figure 19. Radio Receiver R-1148(P)/GRC, voltage and resistance diagram.

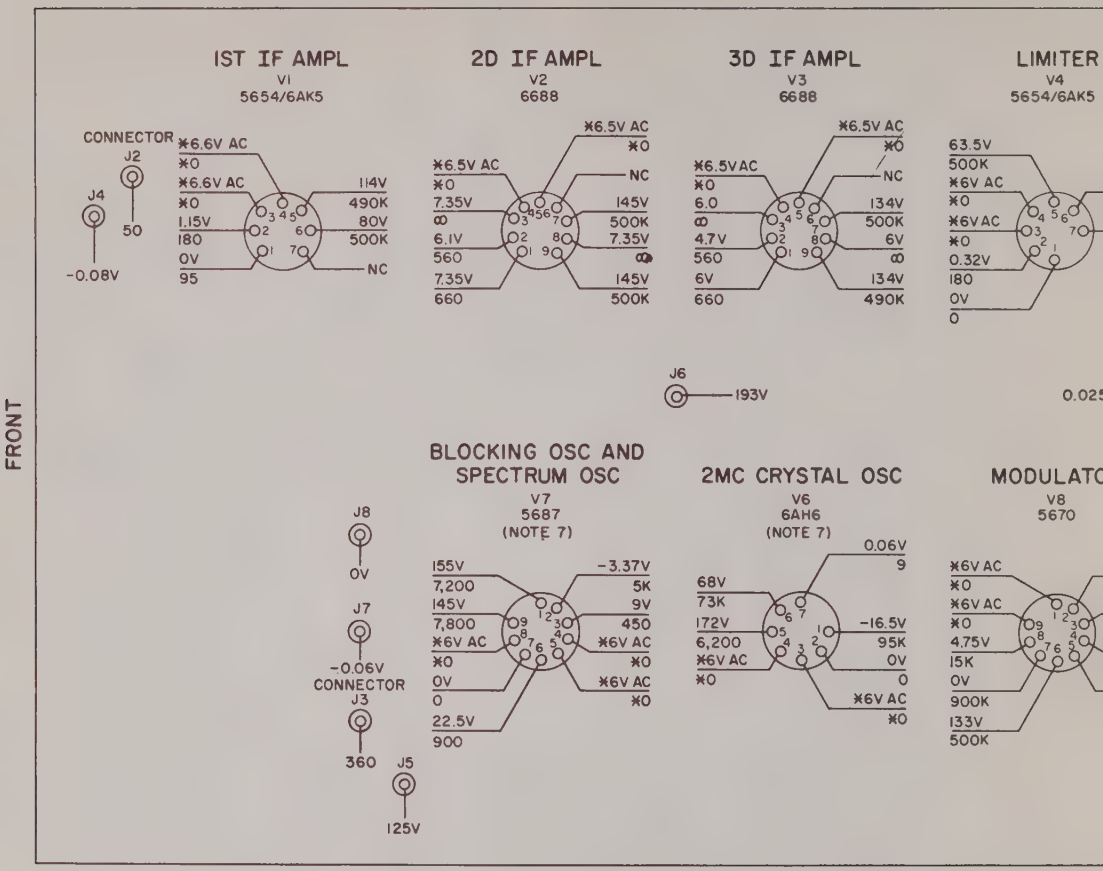
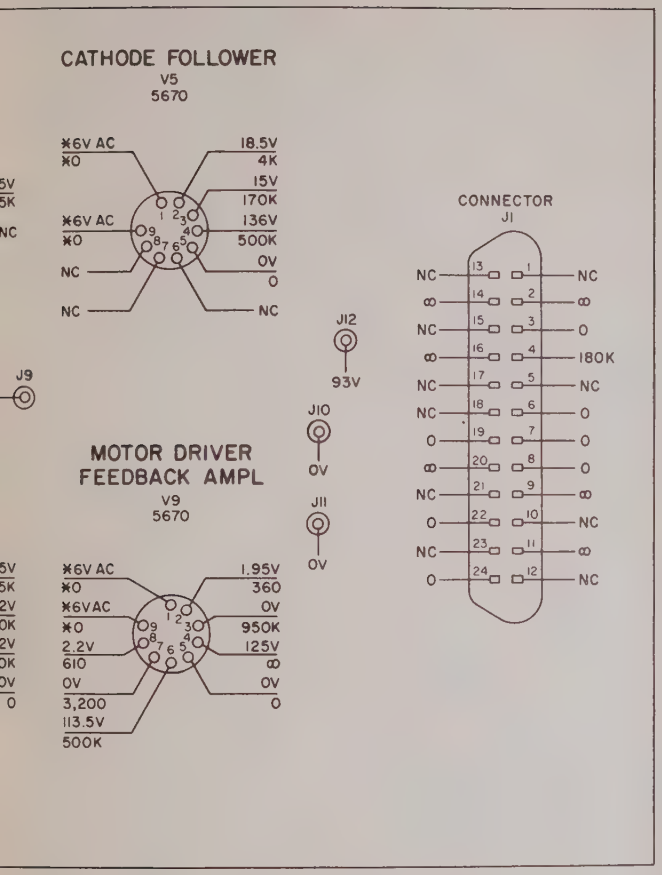


Figure 20. Afc assembly



4/3A4, voltage and resistance diagram.

NOTES:

1. VOLTAGE READINGS APPEAR ABOVE LINE. RESISTANCE READINGS APPEAR BELOW LINE.
2. UNLESS OTHERWISE SHOWN, DC VOLTAGES AND RESISTANCES ARE MEASURED TO GROUND WITH THE UNIT CONNECTED TO THE FRAME.
3. * INDICATES MEASUREMENT ACROSS FILAMENT.
4. ONLY RESISTANCE READINGS ARE TAKEN FOR J1, J2, AND J3 (WITH THE UNIT DISCONNECTED FROM THE FRAME).
5. ALL VOLTAGE AND RESISTANCE MEASUREMENT ARE TAKEN WITH A 20,000 OHMS-PER-VOLT METER.
6. LISTED MEASUREMENTS ARE VALID WHETHER UNIT IS CONNECTED TO RADIO RECEIVER R-1148(P)/GRC (TUNED TO CHANNEL 650 WITH -50 DBM SIGNAL INPUT) OR TO RADIO TRANSMITTER T-893(P)/GRC (TUNED TO CHANNEL 650).
7. WHERE INDICATED, [AFC TUNE/ODD/EVEN] SWITCH SET TO [TUNE].

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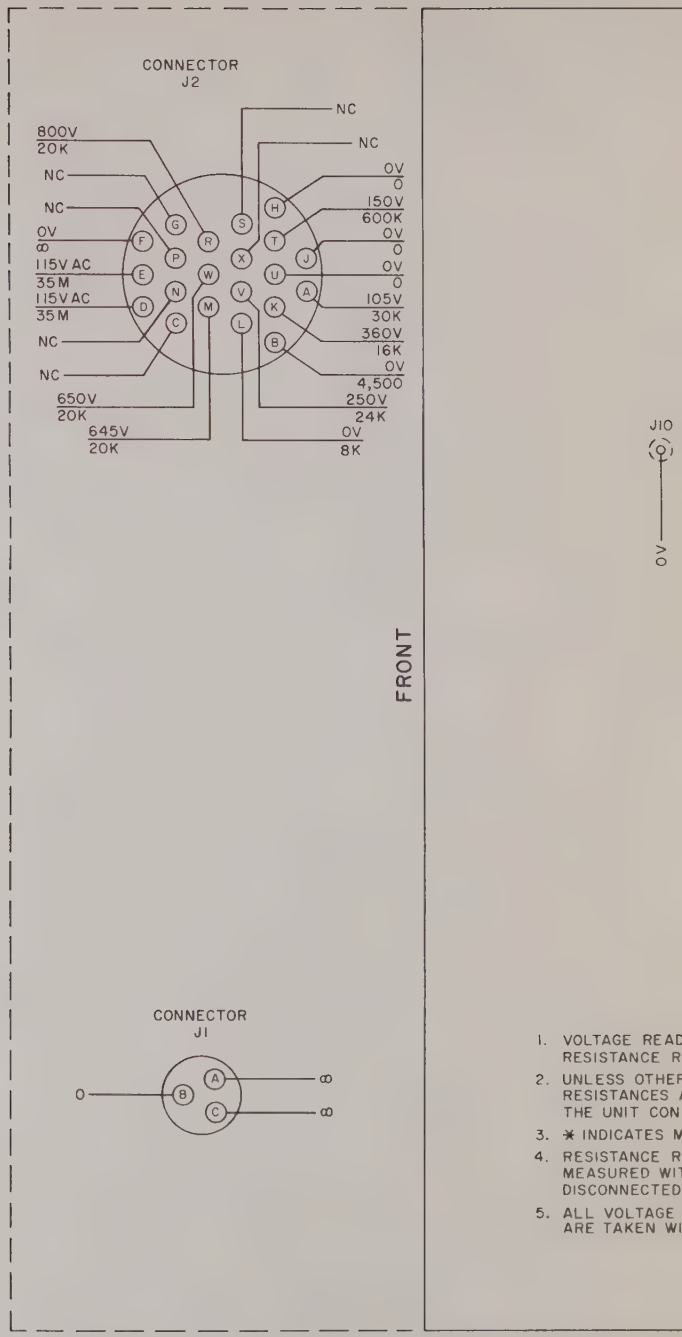
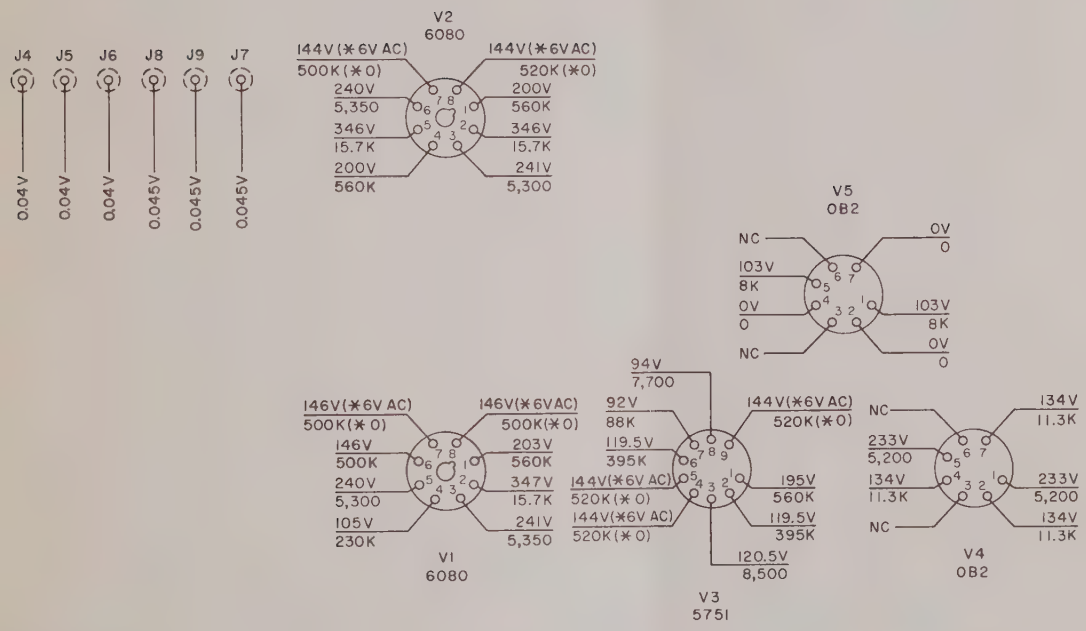

CONNECTOR
J2
800V
20K
NC
NC
0V
∞
115V AC
35M
115V AC
35M
NC
NC
650V
20K
645V
20K
NC
NC
0V
0
150V
600K
0V
0
0V
0
105V
30K
360V
16K
0V
4,500
250V
24K
0V
8K
FRONT
J10
0V
CONNECTOR
J1
0
∞
∞
1. VOLTAGE READ
RESISTANCE R
2. UNLESS OTHER
RESISTANCES
THE UNIT CON
3. * INDICATES M
4. RESISTANCE R
MEASURED WI
DISCONNECTED
5. ALL VOLTAGE
ARE TAKEN WI

Figure 2



REAR

NOTES:

APPEAR ABOVE LINE.
NGS APPEAR BELOW LINE.
SHOWN, DC VOLTAGES AND
MEASURED TO GROUND WITH
ED TO T-893(P)/GRC.
REMENT ACROSS FILAMENT.
NGS FOR J1 AND J2 ARE
-4558/U AND CX-4559/U

RESISTANCE MEASUREMENTS
20,000 OHMS-PER-VOLT METER.

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Power Supply PP-2054/GRC, voltage and resistance diagram.

NOTES:

1. VOLTAGE READINGS APPEAR ABOVE LINE. RESISTANCE READINGS APPEAR BELOW LINE.
2. UNLESS OTHERWISE SHOWN, DC VOLTAGES AND RESISTANCES ARE MEASURED TO GROUND WITH THE UNIT CONNECTED TO THE FRAME.
3. * INDICATES MEASUREMENT ACROSS FILAMENT.
4. + INDICATES RESISTANCE TAKEN WITH POSITIVE PROBE GROUNDED AND NEGATIVE PROBE AT POINT TO BE MEASURED.
5. ONLY RESISTANCE READINGS ARE TAKEN FOR J1, J2, A J3 (WITH THE UNIT DISCONNECTED FROM THE FRAME)
6. ALL VOLTAGE AND RESISTANCE MEASUREMENTS AR TAKEN WITH A 20,000 OHMS-PER-VOLT METER.
7. RADIO RECEIVER R-1148(P)/GRC TUNED TO CHANNEL 650; SIGNAL INPUT, -50 DBM.

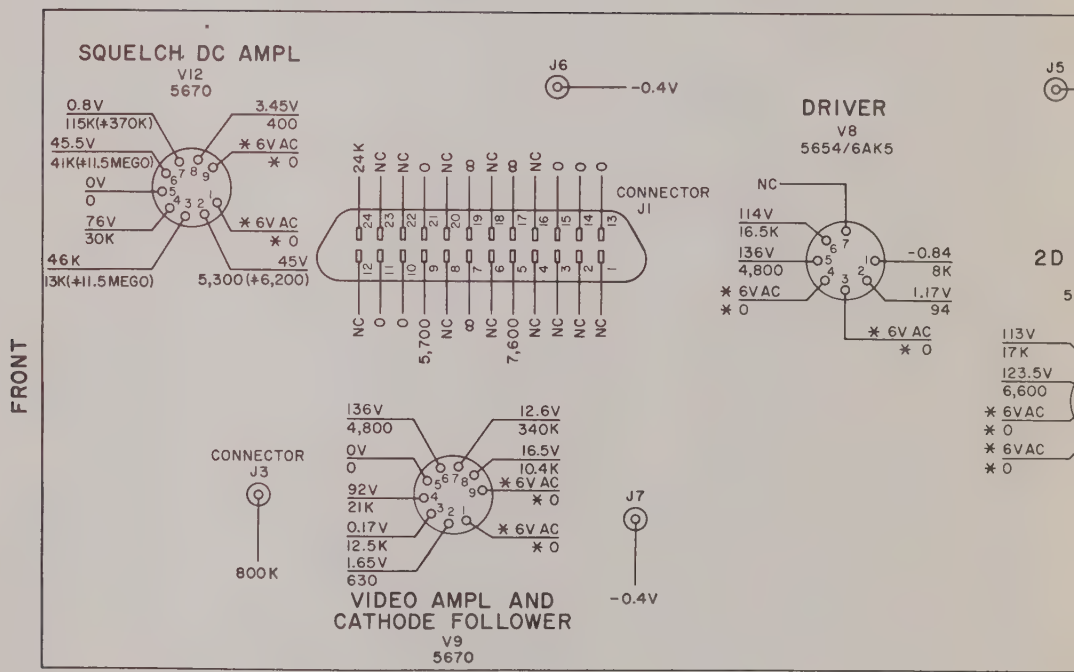
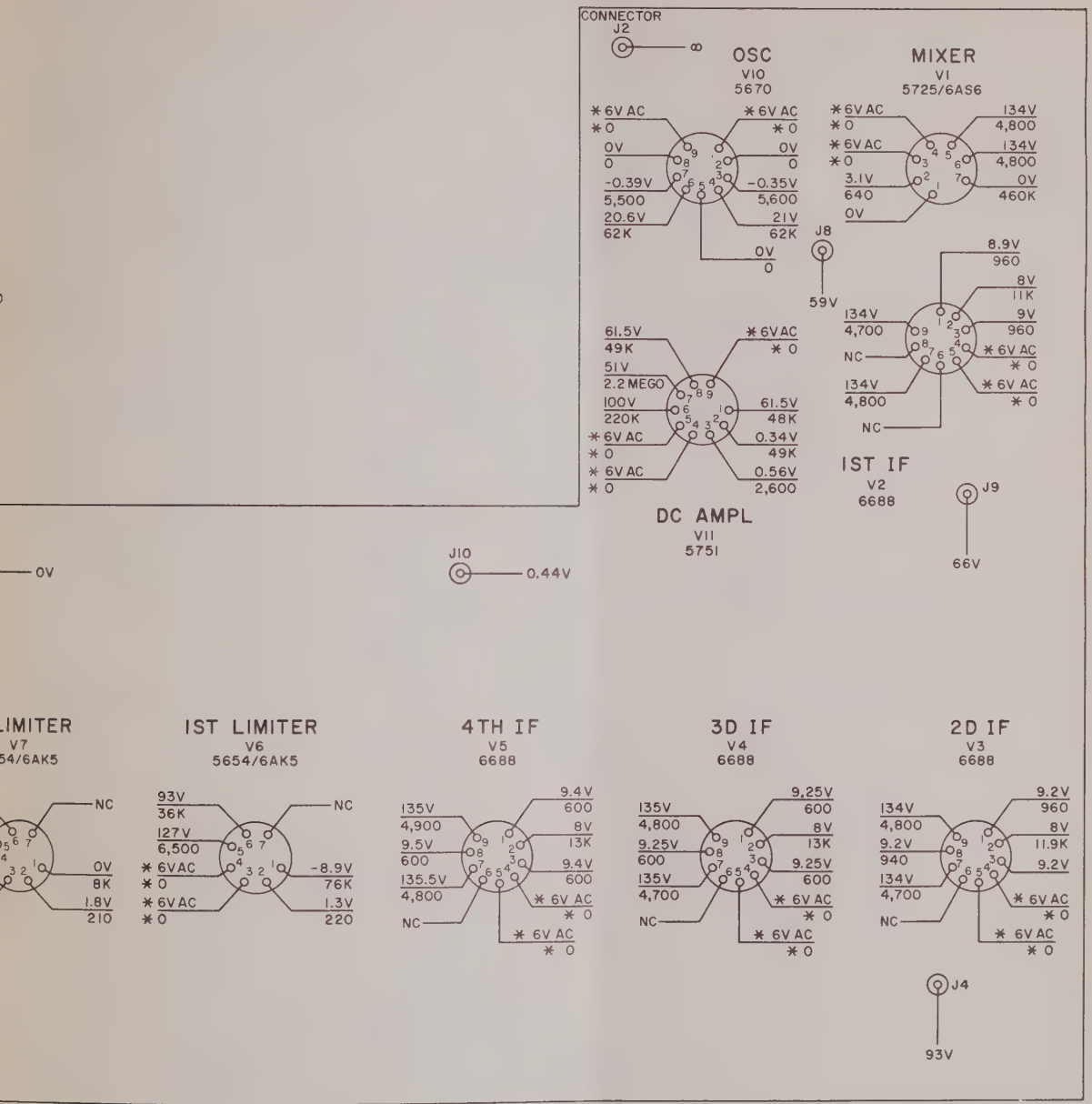


Figure 22. Second if. as



embly 3A5, voltage and resistance diagram.

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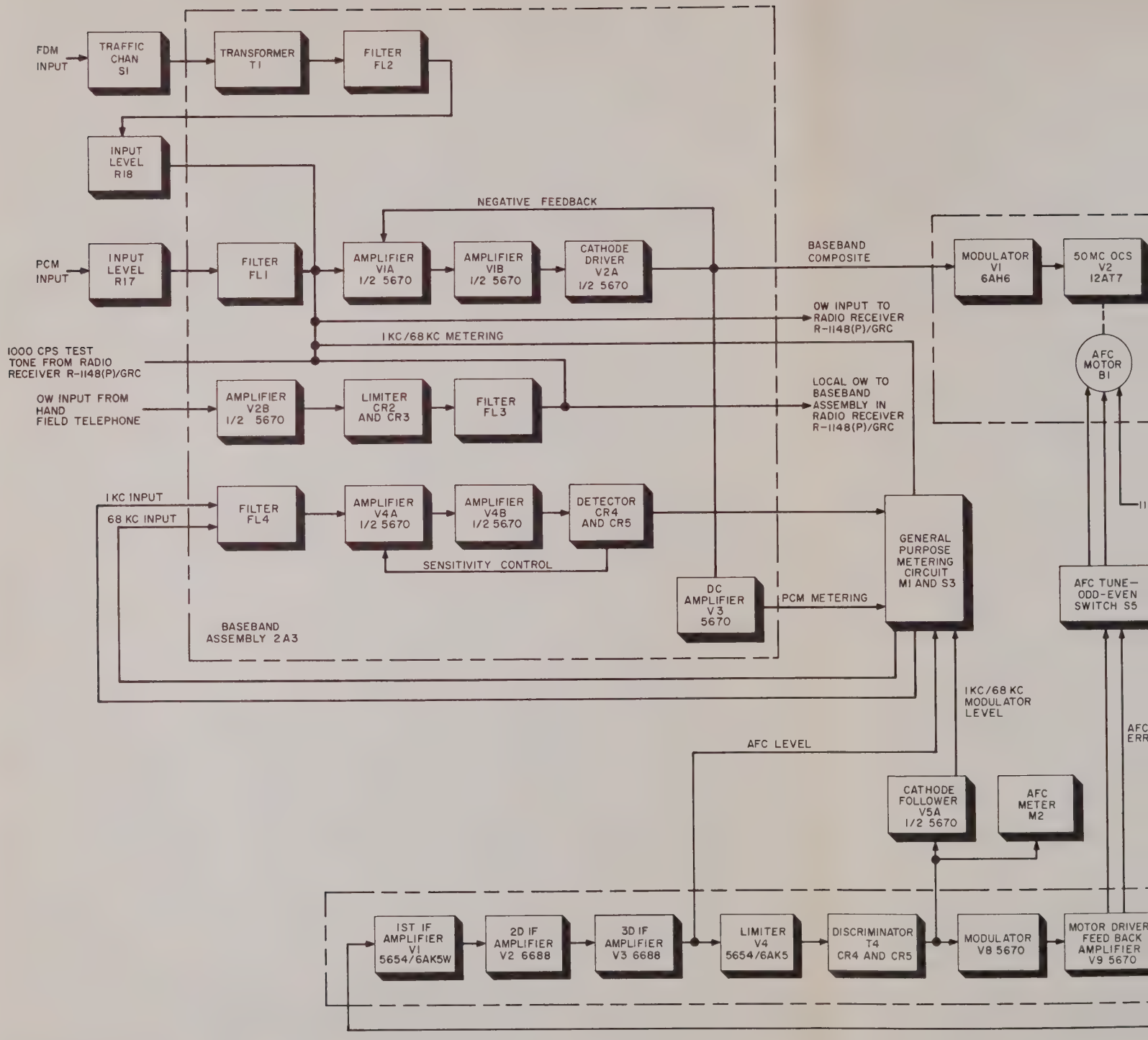
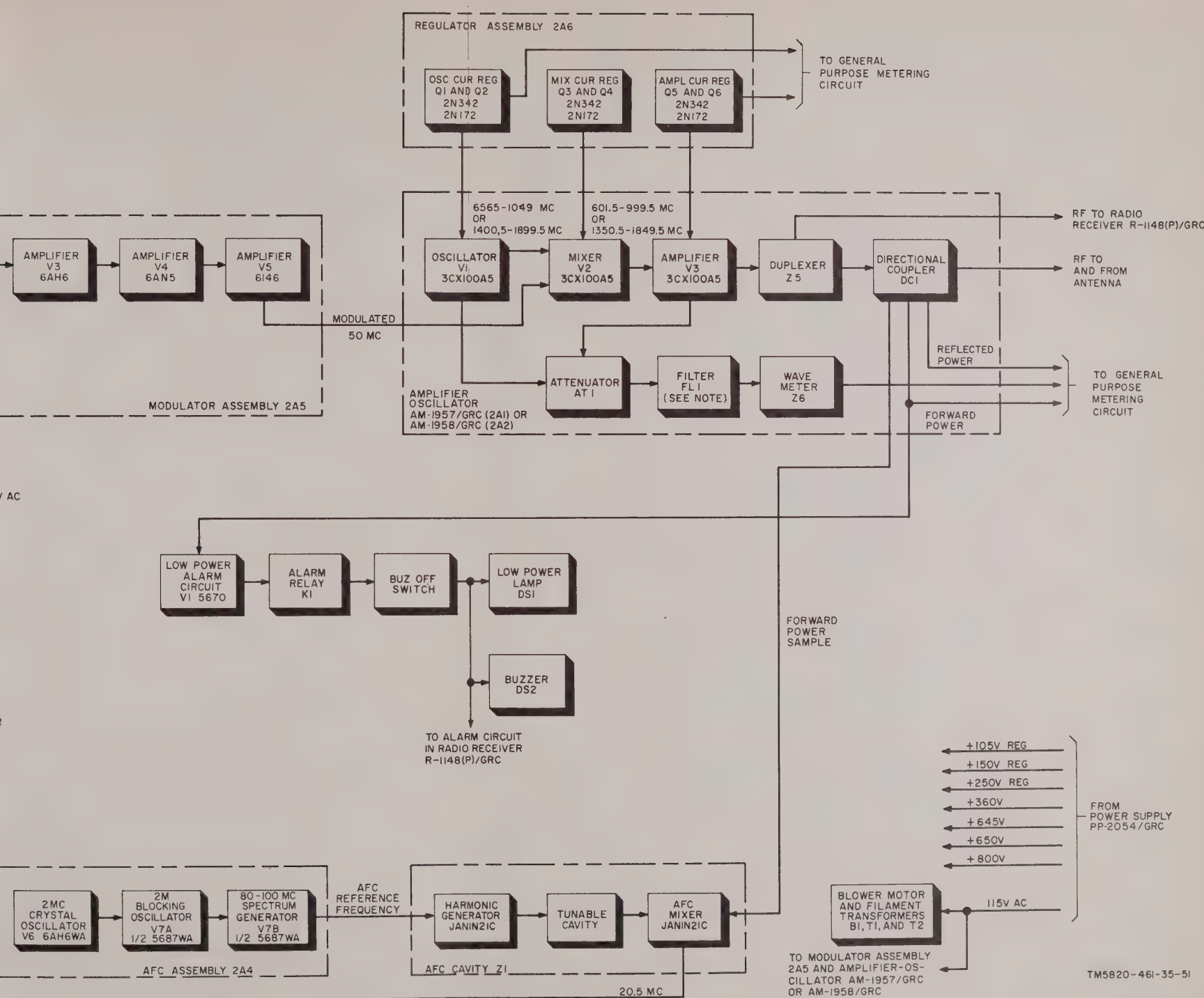


Figure 23. Radio Tr



smitter T-893(P)/GRC, block diagram.

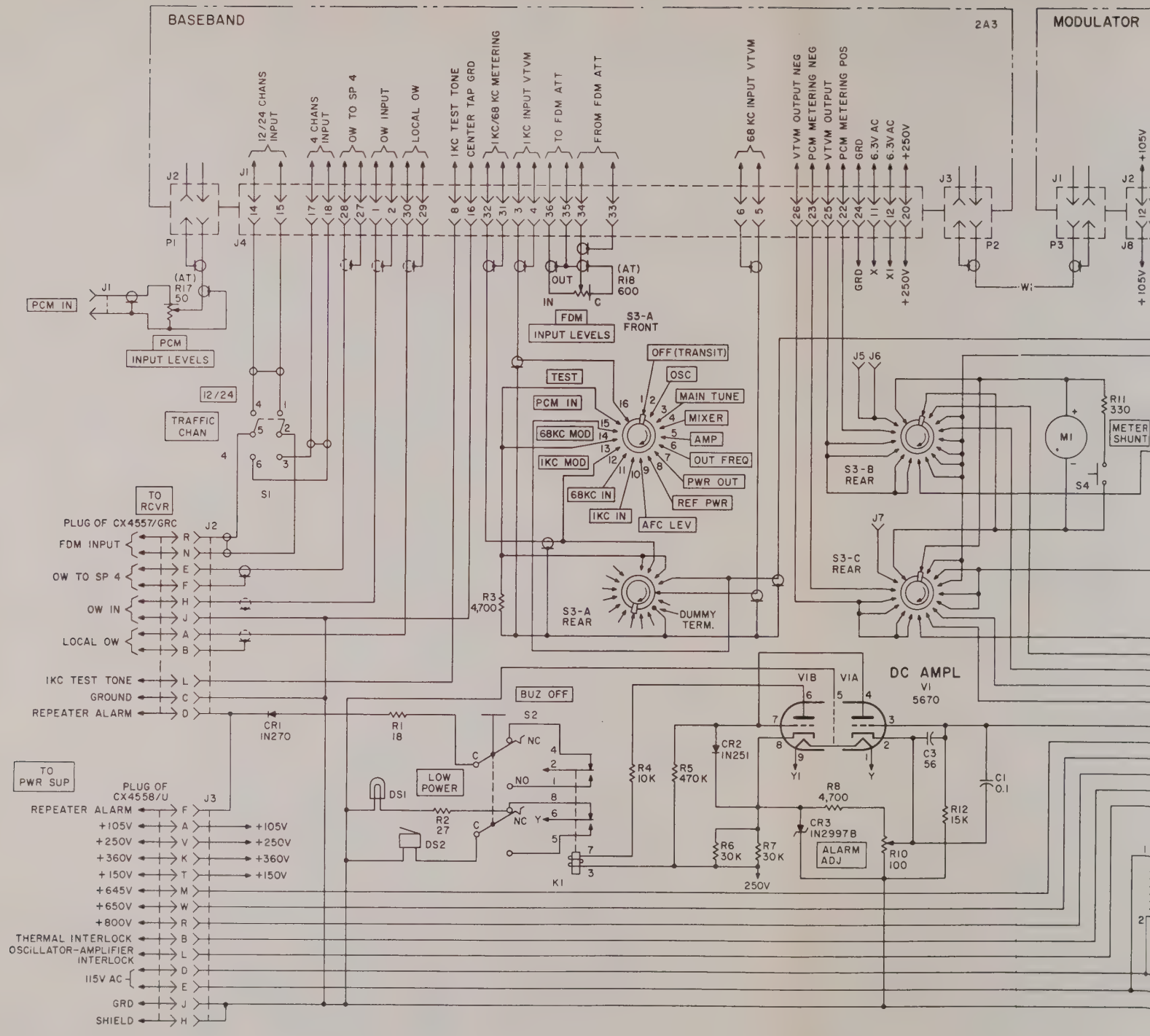
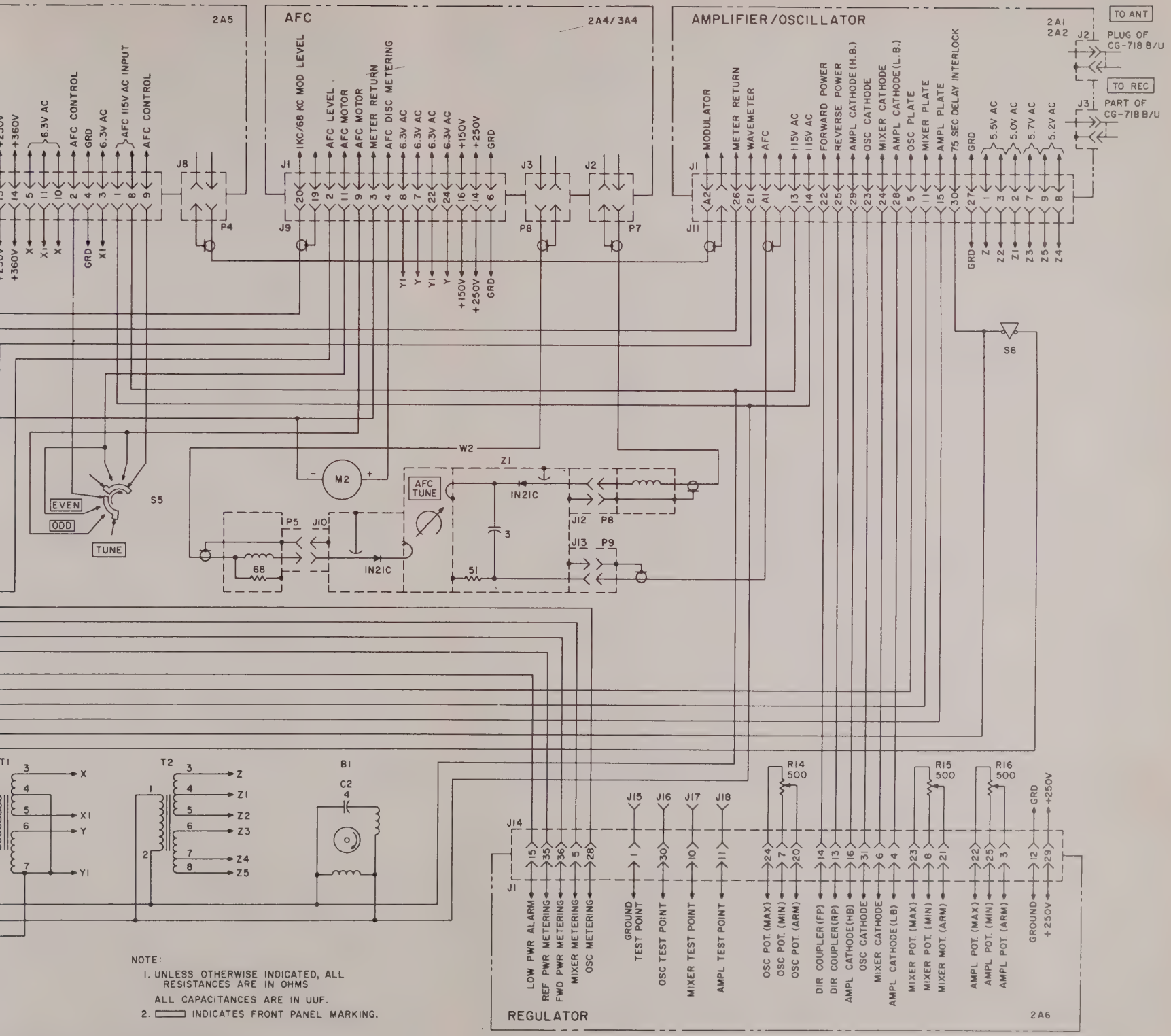


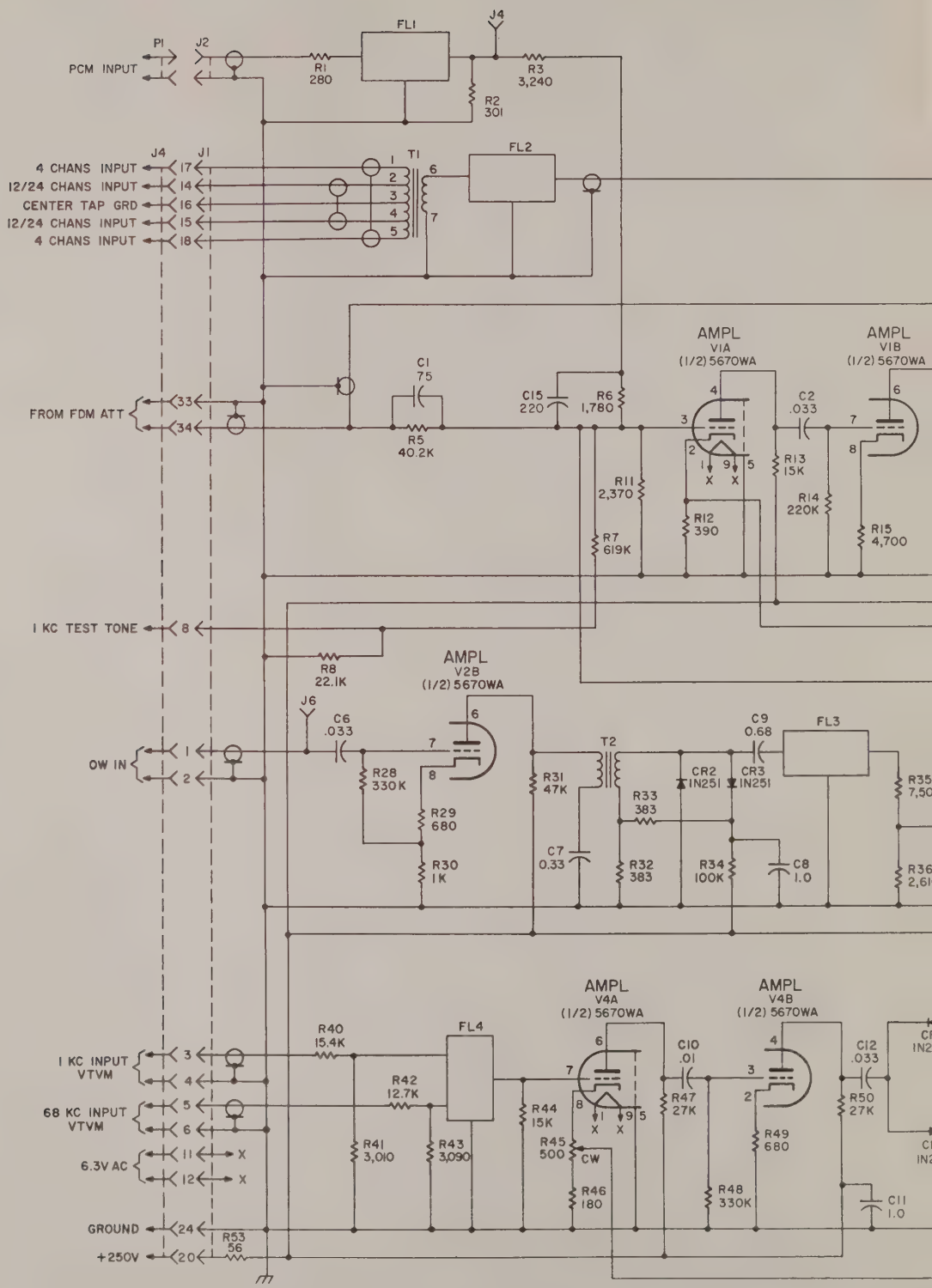
Figure 24. Radio Transmitter



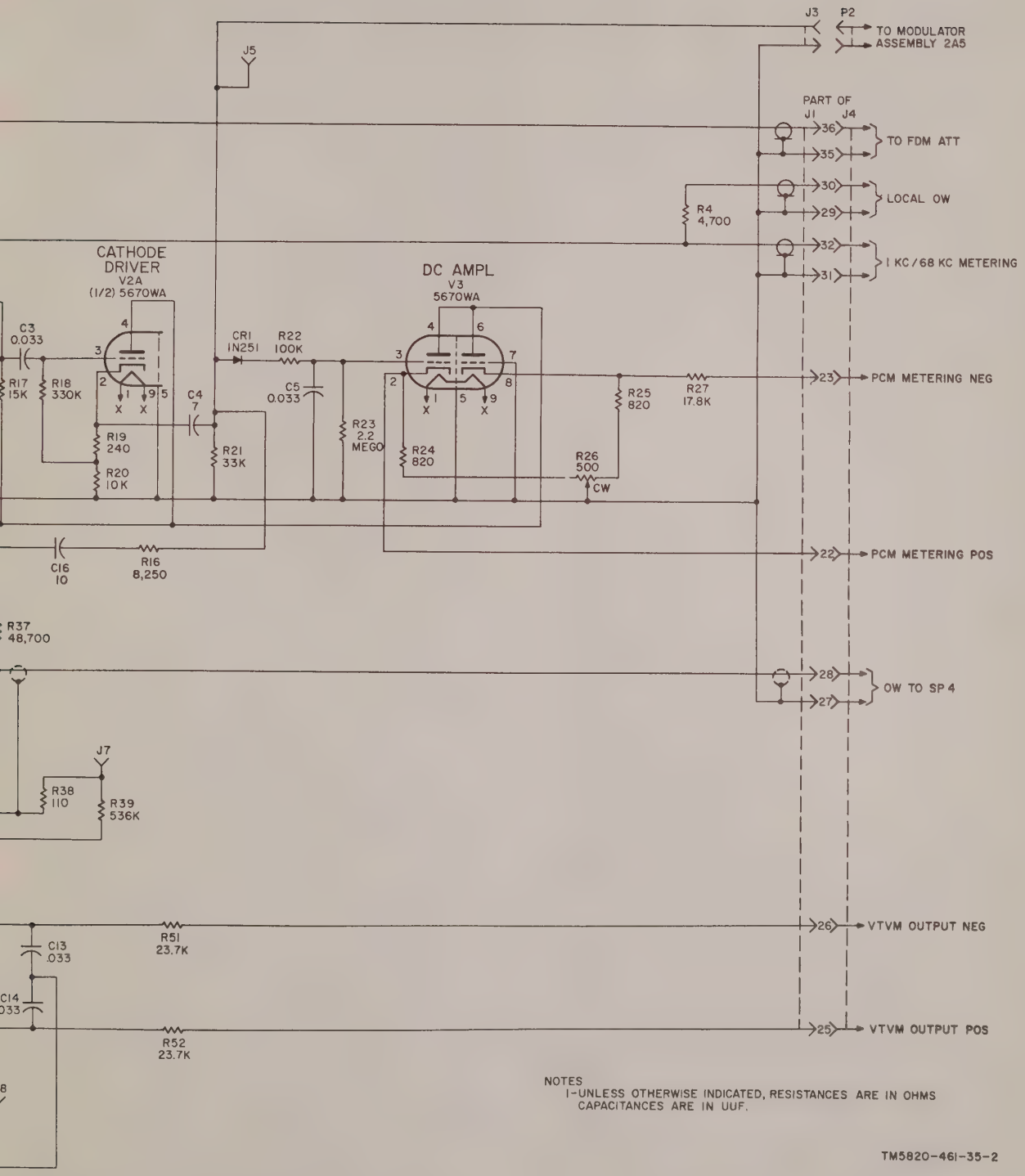
NOTE:
1. UNLESS OTHERWISE INDICATED, ALL RESISTANCES ARE IN OHMS
ALL CAPACITANCES ARE IN UUF.
2. ▭ INDICATES FRONT PANEL MARKING.

TM5820-461-35-1

T-893(P)/GRC, main frame schematic diagram.


PCM INPUT
P1
J2
FL1
J4
R1 280
R2 301
R3 3,240
4 CHANS INPUT
12/24 CHANS INPUT
CENTER TAP GRD
12/24 CHANS INPUT
4 CHANS INPUT
J4
J1
T1
FL2
FROM FDM ATT
33
34
C1 75
R5 40.2K
C15 220
R6 1,780
AMPL V1A (1/2) 5670WA
AMPL V1B (1/2) 5670WA
C2 .033
R13 15K
R14 220K
R15 4,700
R11 2,370
R12 390
R7 619K
1 KC TEST TONE
8
R8 22.1K
AMPL V2B (1/2) 5670WA
J6
C6 .033
OW IN
1
2
R28 330K
R29 680
R30 1K
R31 47K
T2
C7 0.33
R33 383
R32 383
CR2 IN251
CR3 IN251
C9 0.68
FL3
R34 100K
C8 1.0
R35 7,50
R36 2,61
AMPL V4A (1/2) 5670WA
AMPL V4B (1/2) 5670WA
1 KC INPUT VTVM
3
4
68 KC INPUT VTVM
5
6
6.3V AC
11
12
GROUND
24
+250V
20
R53 56
R40 15.4K
FL4
R42 12.7K
R41 3,010
R43 3,090
R44 15K
R45 500 CW
R46 180
C10 .01
R47 27K
R48 330K
R49 680
C12 .033
R50 27K
C11 1.0

Fig



re 25. Baseband assembly 2A3, schematic diagram.

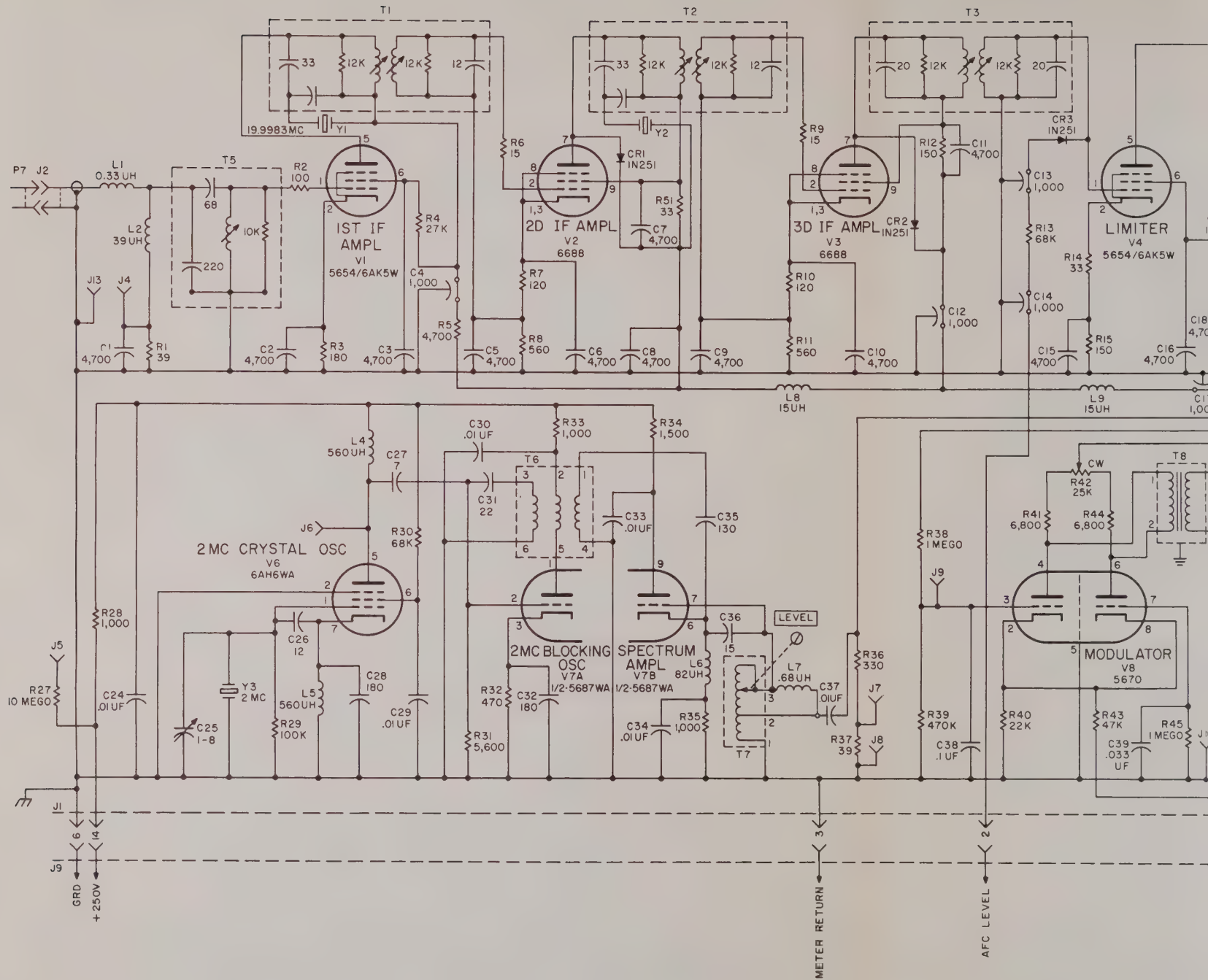
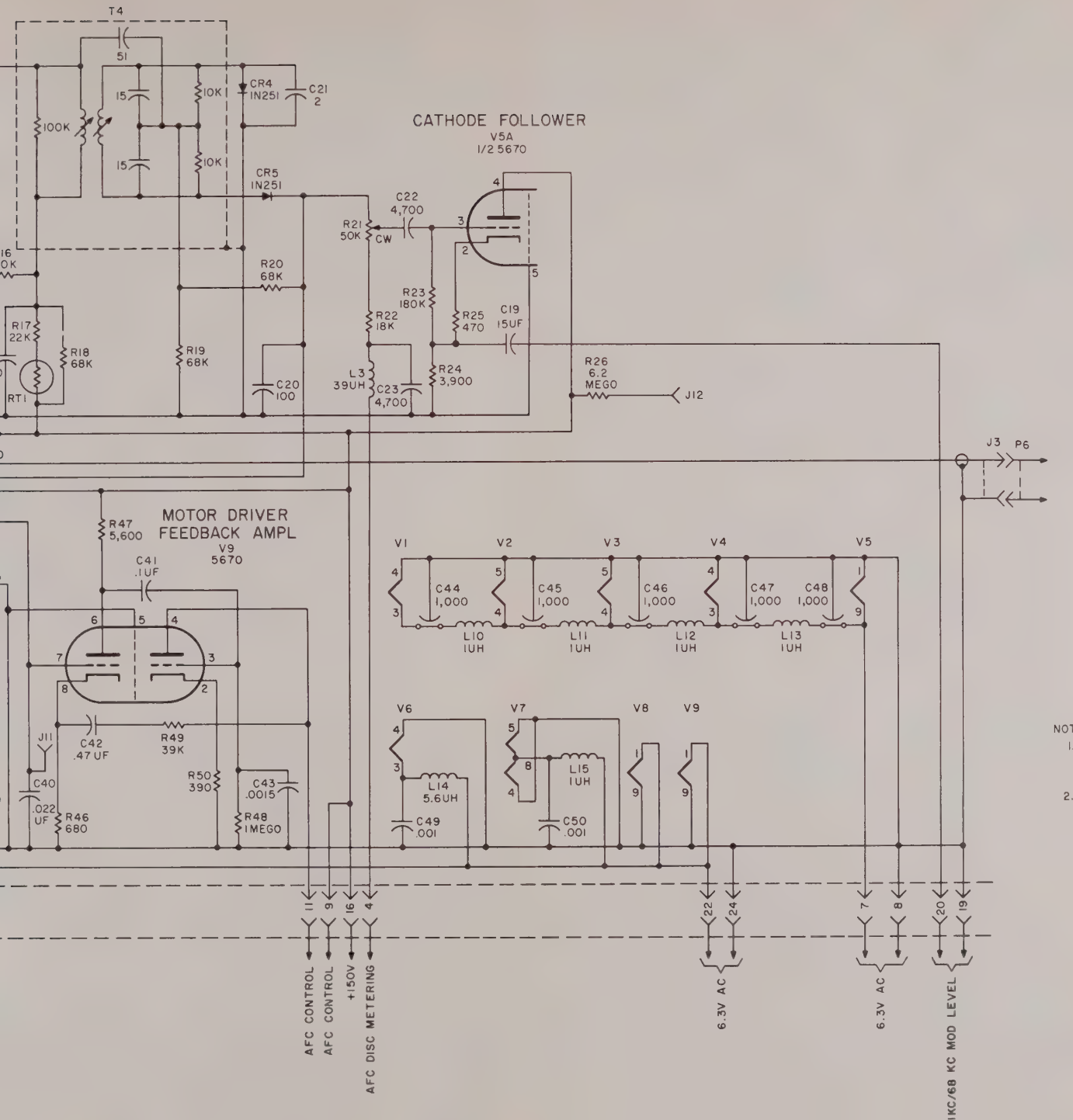


Figure 26. Afc assembl

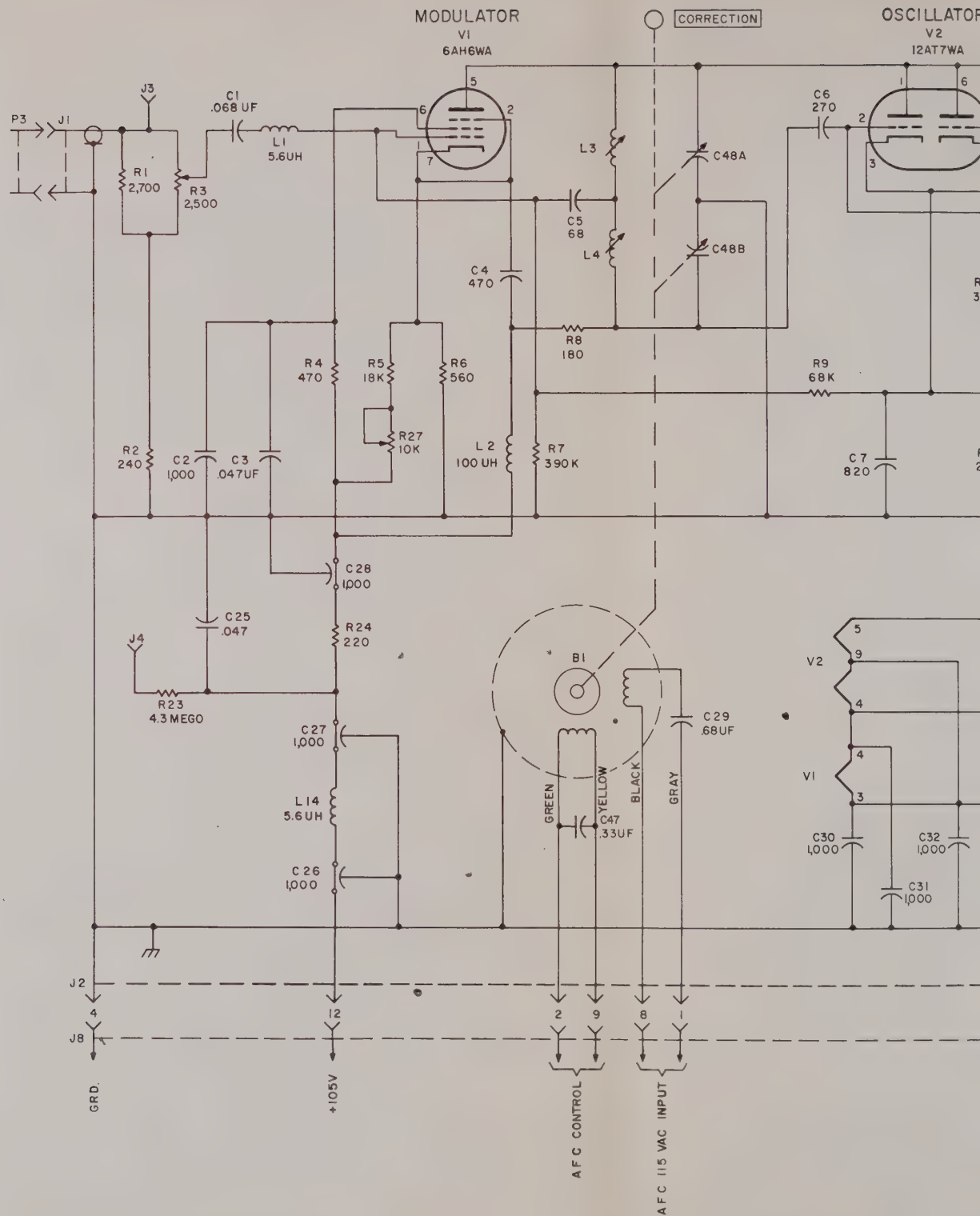


NOTE:

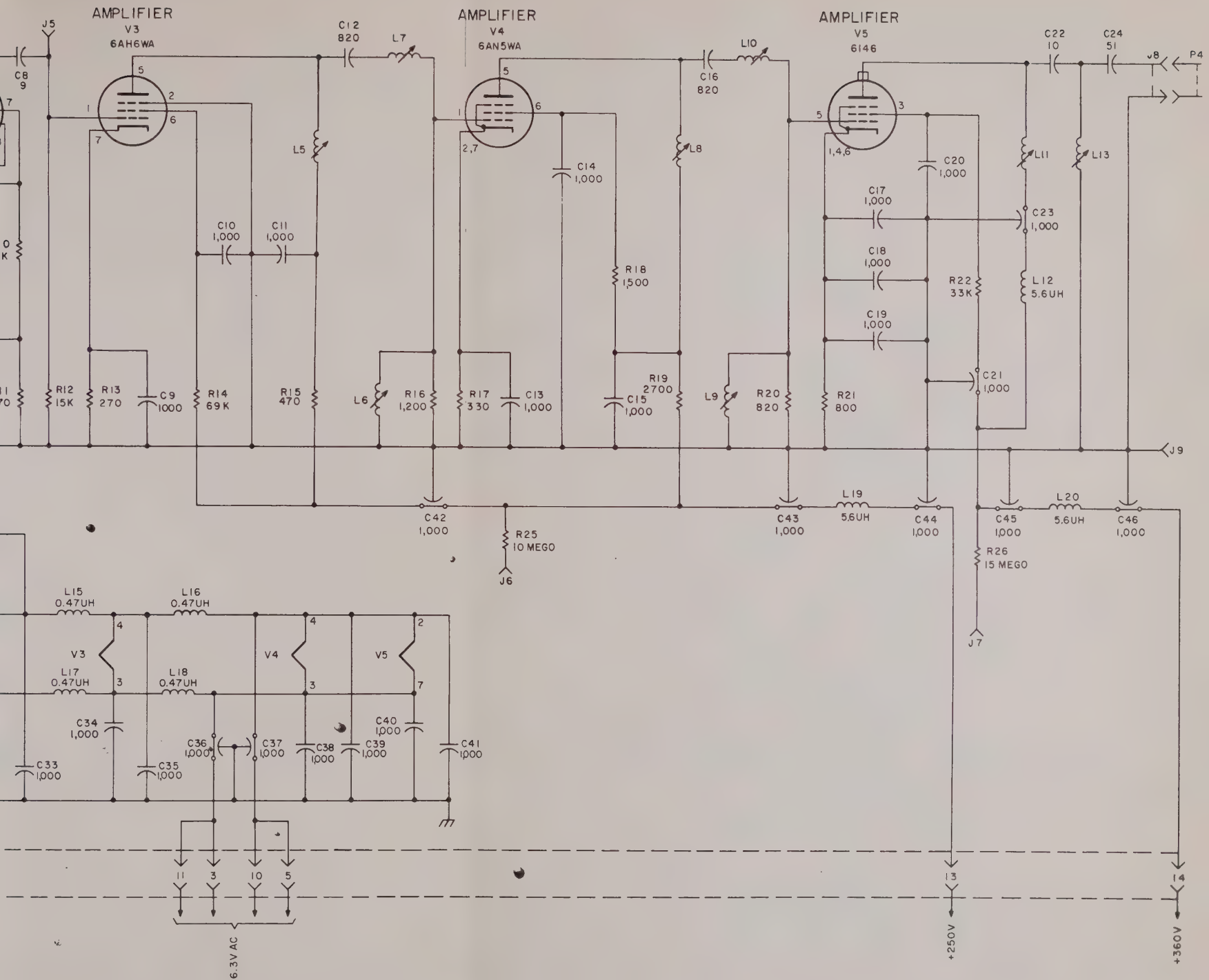
1. UNLESS OTHERWISE INDICATED, ALL RESISTANCES ARE IN OHMS
   ALL CAPACITANCES ARE IN UUF.
2. ▭ INDICATES FRONT PANEL MARKING.

TM5820-461-35-3

y 2A4/3A4, schematic diagram.


MODULATOR
V1
6AH6WA
CORRECTION
OSCILLATOR
V2
12AT7WA
P3
J1
J3
C1
.068 UF
L1
5.6UH
R1
2,700
R3
2,500
L3
C48A
C5
68
L4
C48B
C4
470
C6
270
R8
180
R4
470
R5
18K
R6
560
R9
68K
R27
10K
R2
240
C2
1,000
C3
.047UF
L2
100 UH
R7
390K
C7
820
C28
1,000
C25
.047
R24
220
J4
R23
4.3 MEGO
B1
C29
.68UF
C27
1,000
L14
5.6UH
C26
1,000
GREEN
YELLOW
BLACK
GRAY
C47
.33UF
C30
1,000
C32
1,000
C31
1,000
J2
J8
GRD.
+105V
AFC CONTROL
AFC 115 VAC INPUT

Figu



NOTES
1- ▭ INDICATES FRONT PANEL MARKING
2-UNLESS OTHERWISE INDICATED, RESISTANCES ARE IN OHMS CAPACITANCES ARE IN UUF.

re 27. Modulator assembly 2A5, schematic diagram.

TM5820-461-35-4

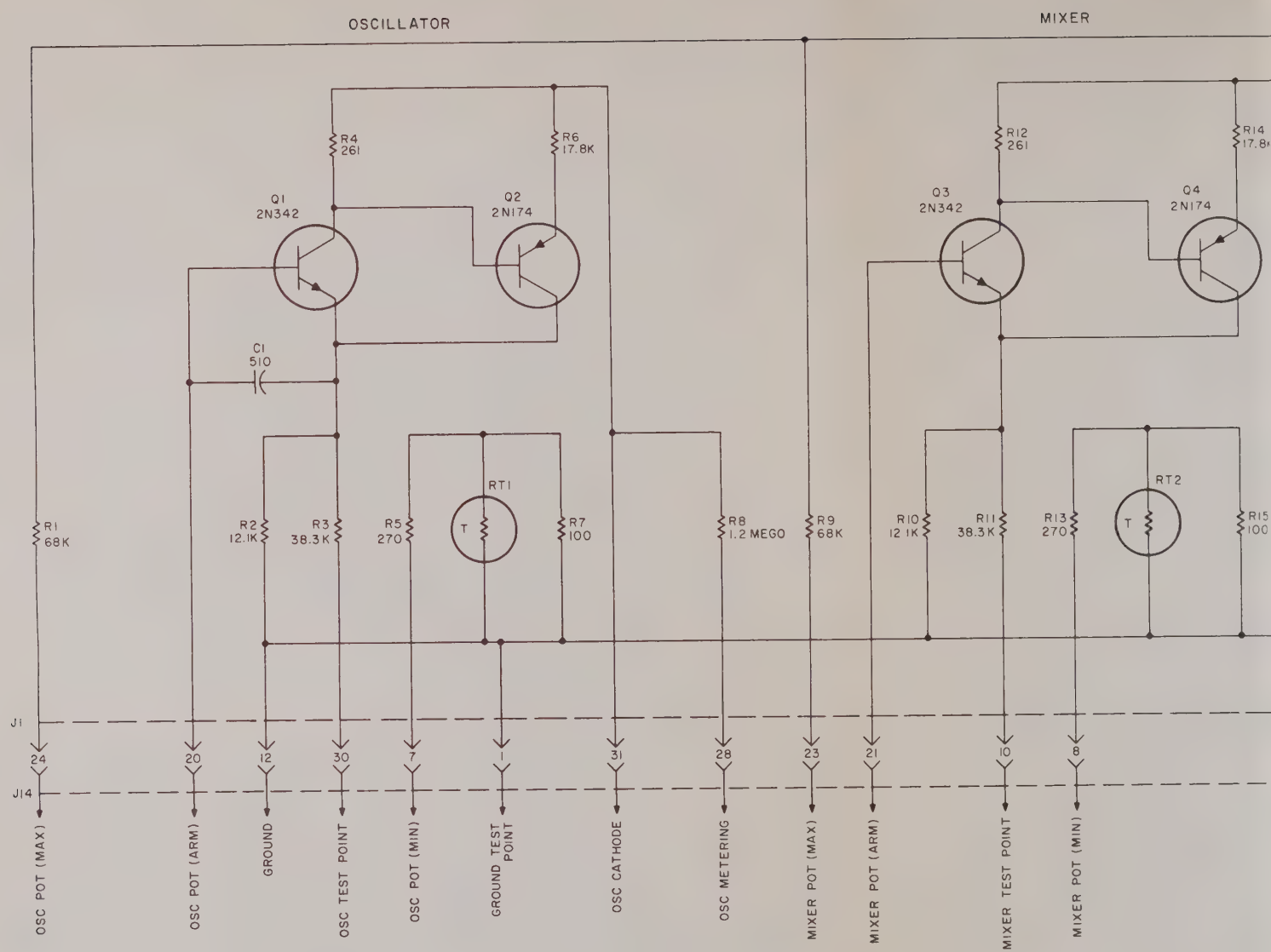
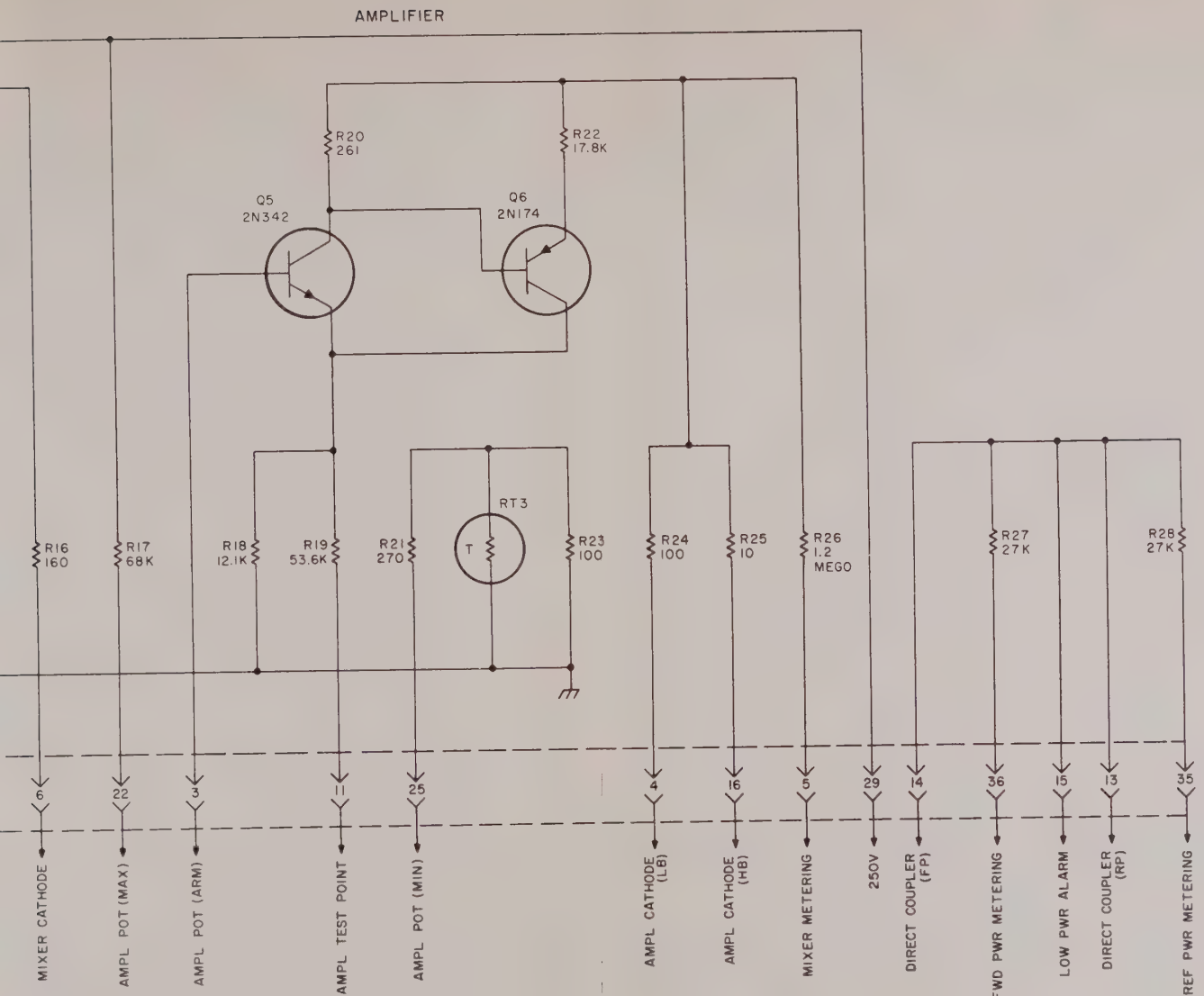

OSCILLATOR
MIXER
R4
261
R6
17.8K
Q1
2N342
Q2
2N174
C1
510
R1
68K
R2
12.1K
R3
38.3K
R5
270
RT1
T
R7
100
R8
1.2 MEGO
R9
68K
R12
261
R14
17.8K
Q3
2N342
Q4
2N174
R10
12.1K
R11
38.3K
R13
270
RT2
T
R15
100
J1
J14
24
20
12
30
7
1
31
28
23
21
10
8
OSC POT (MAX)
OSC POT (ARM)
GROUND
OSC TEST POINT
OSC POT (MIN)
GROUND TEST POINT
OSC CATHODE
OSC METERING
MIXER POT (MAX)
MIXER POT (ARM)
MIXER TEST POINT
MIXER POT (MIN)

Figure 28. Re



NOTE:

UNLESS OTHERWISE INDICATED, RESISTANCES ARE IN OHMS, CAPACITANCES ARE IN UUF.

TM5820-461-35-5

gulator assembly 2A6, schematic diagram.

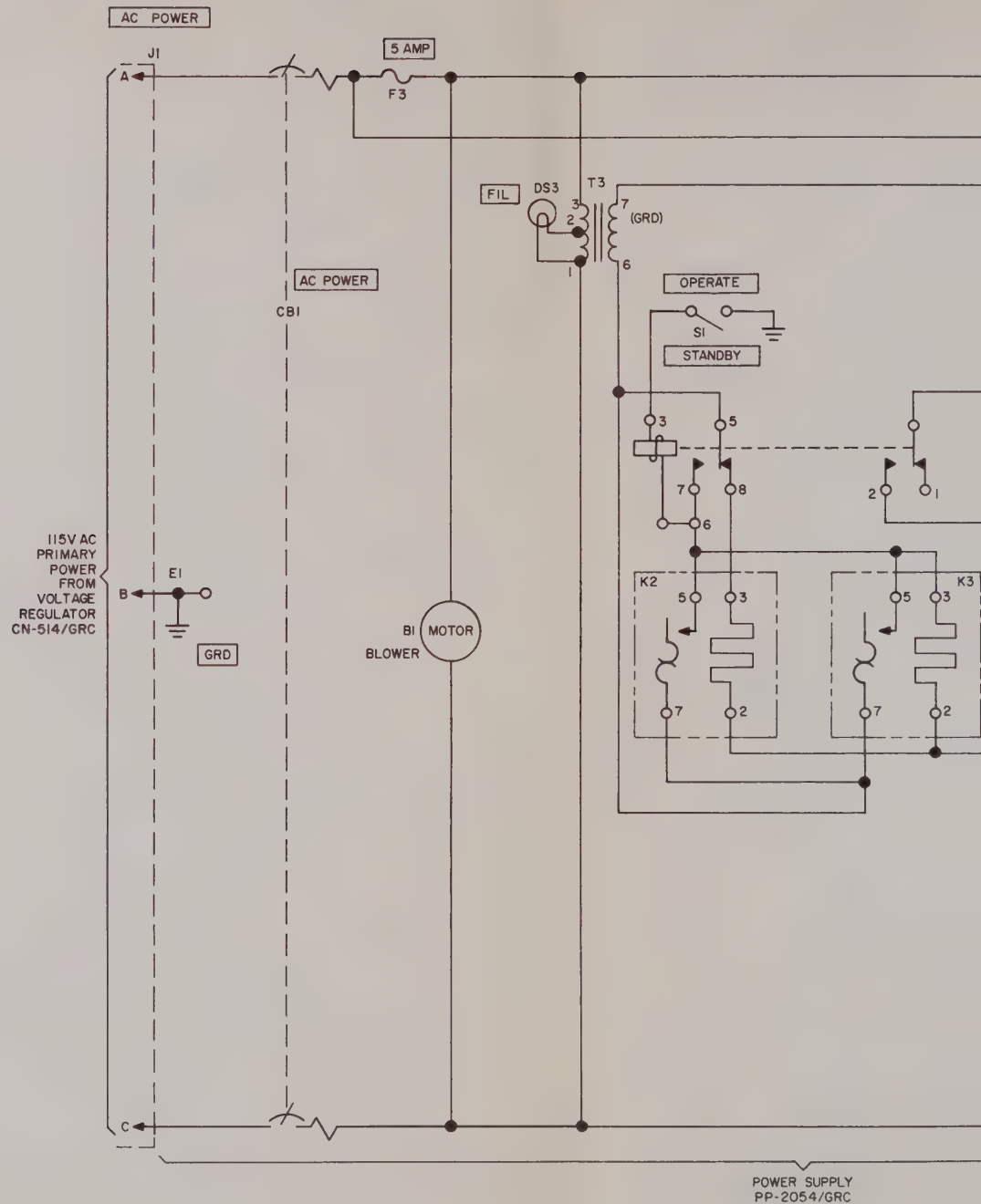
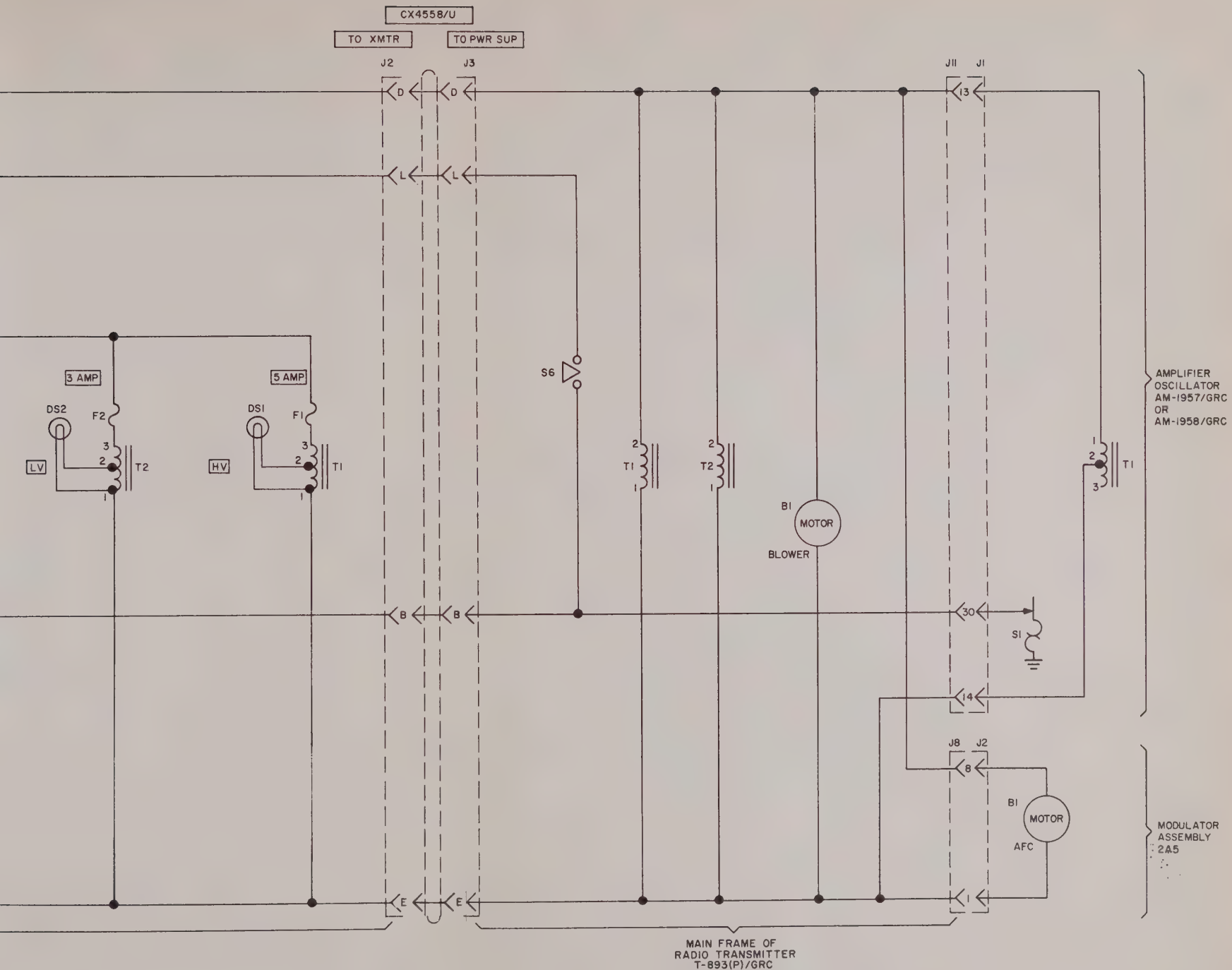

AC POWER
J1
A
5 AMP
F3
FIL
DS3
T3
3
2
1
7
(GRD)
6
AC POWER
CB1
OPERATE
S1
STANDBY
3
5
7
8
6
2
1
K2
K3
5
3
7
2
115V AC
PRIMARY
POWER
FROM
VOLTAGE
REGULATOR
CN-514/GRC
B
E1
GRD
B1
MOTOR
BLOWER
C
POWER SUPPLY
PP-2054/GRC

Figure 2



TM5820-461-35-59

Power control and protective circuits of Radio Transmitter T-893(P)/GRC.

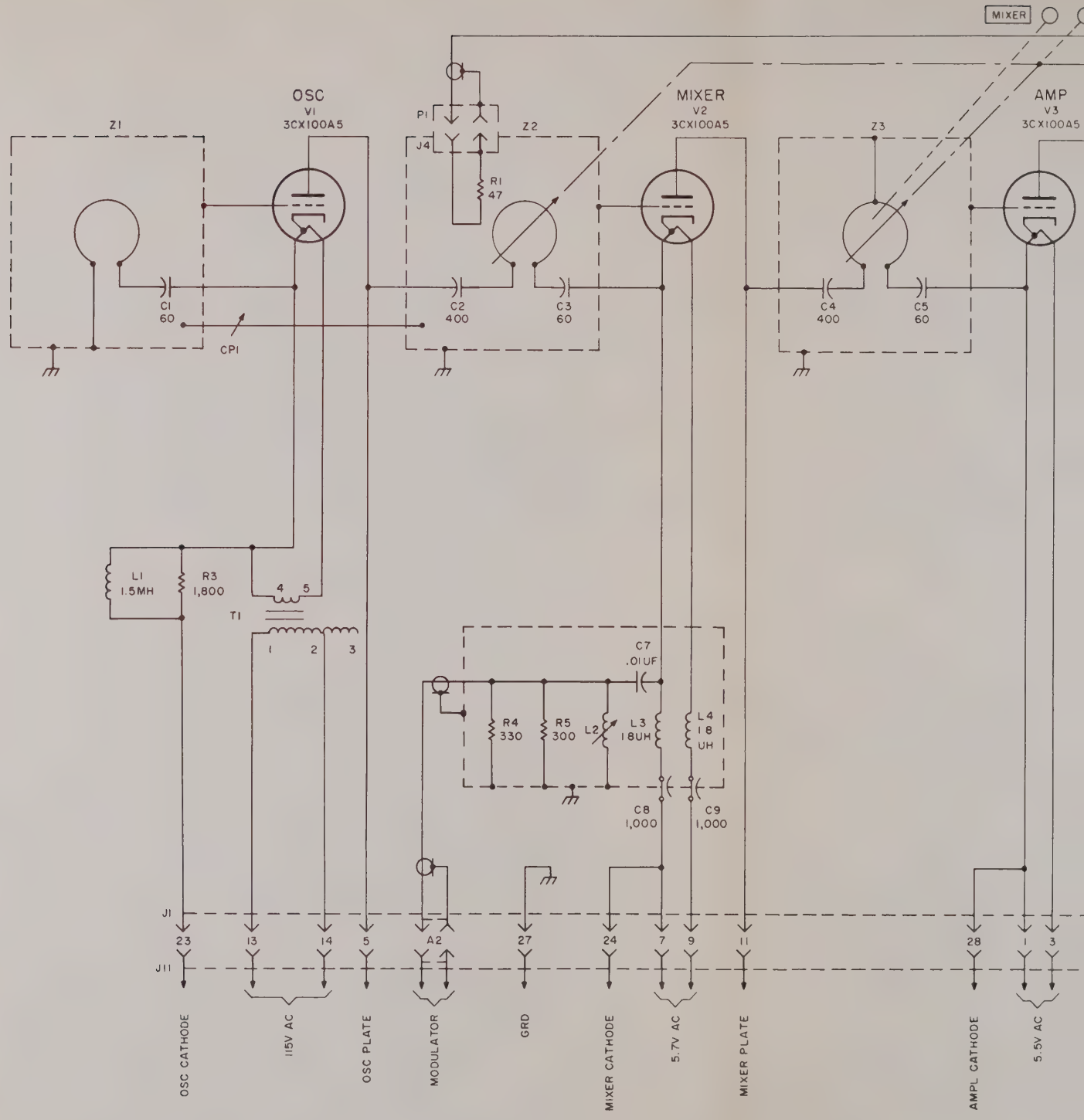
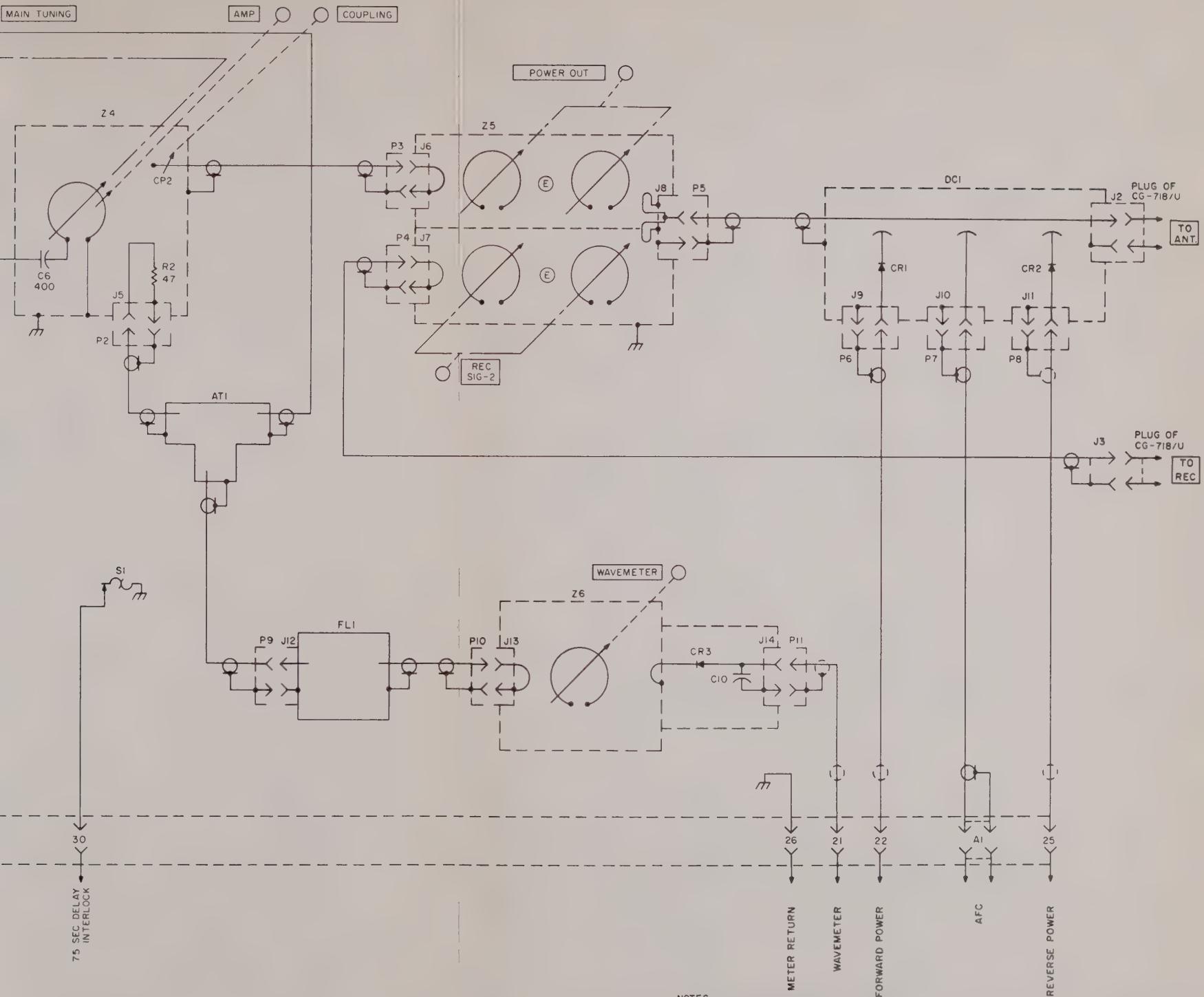


Figure 30. Amp



NOTES
1 - ▭ INDICATES FRONT PANEL MARKING.
2 - UNLESS OTHERWISE INDICATED, RESISTANCES ARE IN OHMS
CAPACITANCES ARE IN UUF

TM5820-461-35-6

ier-Oscillator AM-1957/GRC, schematic diagram.

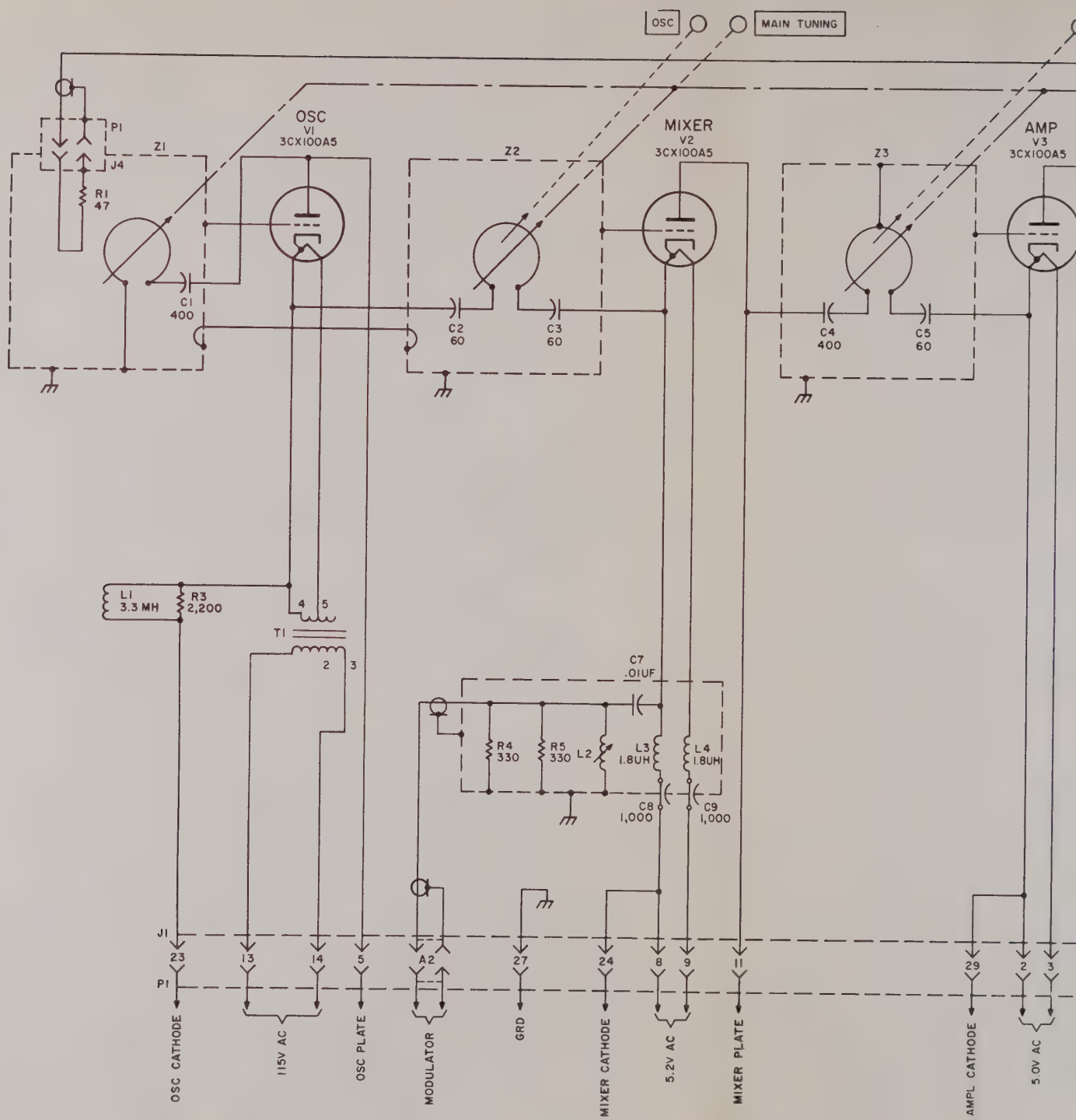
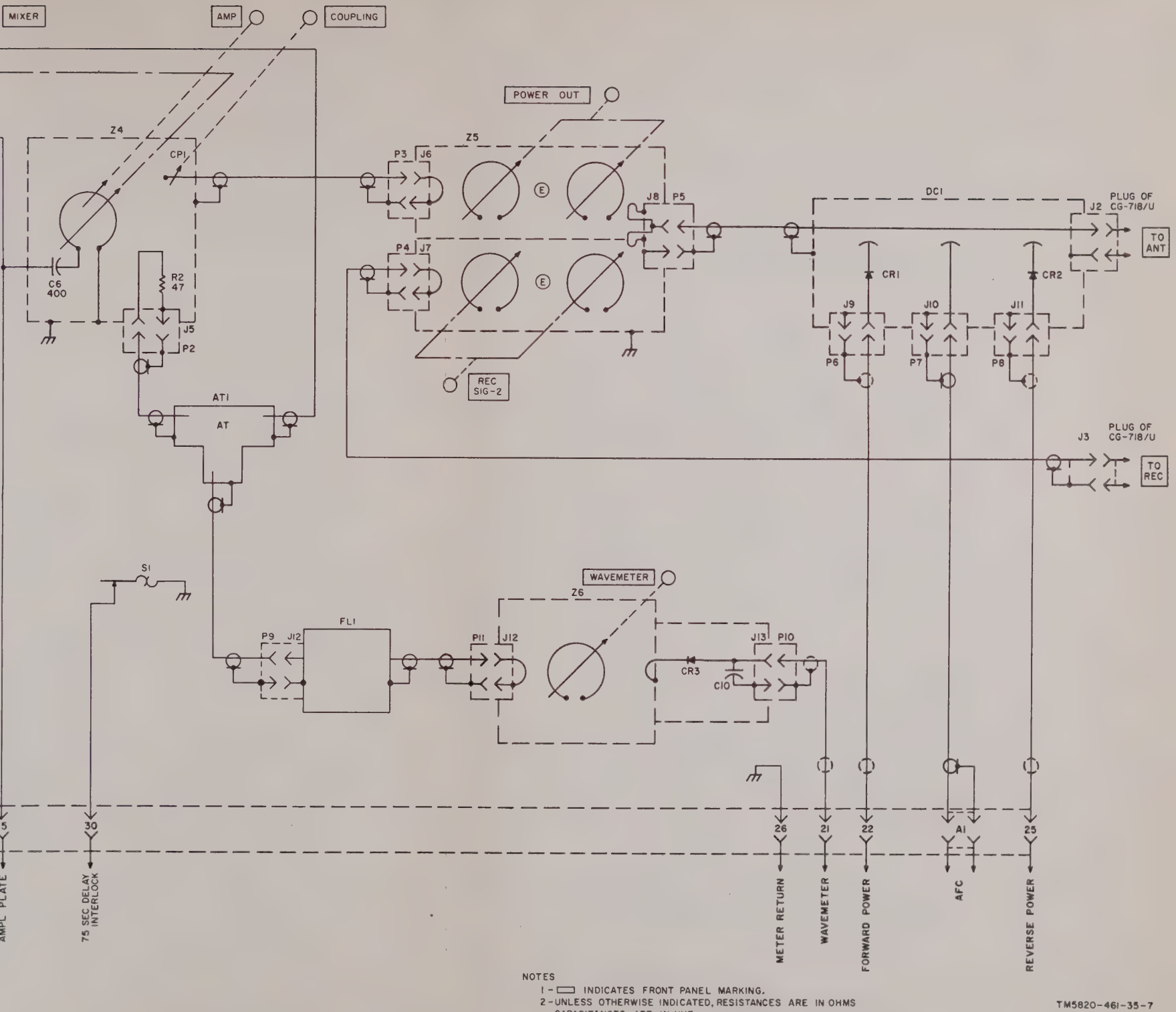


Figure 31. Ampl



NOTES

1 - ▭ INDICATES FRONT PANEL MARKING.

2 - UNLESS OTHERWISE INDICATED, RESISTANCES ARE IN OHMS CAPACITANCES ARE IN UUF.

TM5820-461-35-7

fier-Oscillator AM-1958/GRC, schematic diagram.

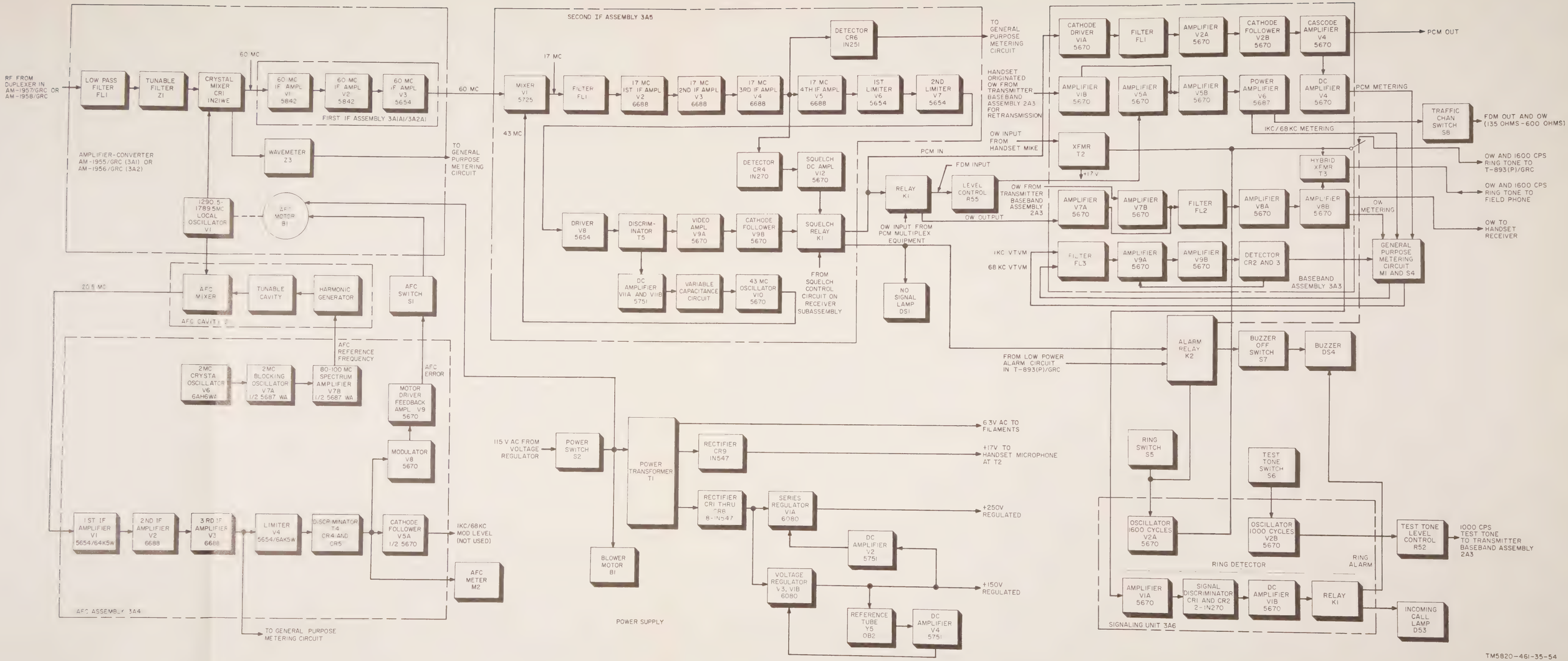


Figure 32. Radio Receiver R-1148(P)/GRC, block diagram.

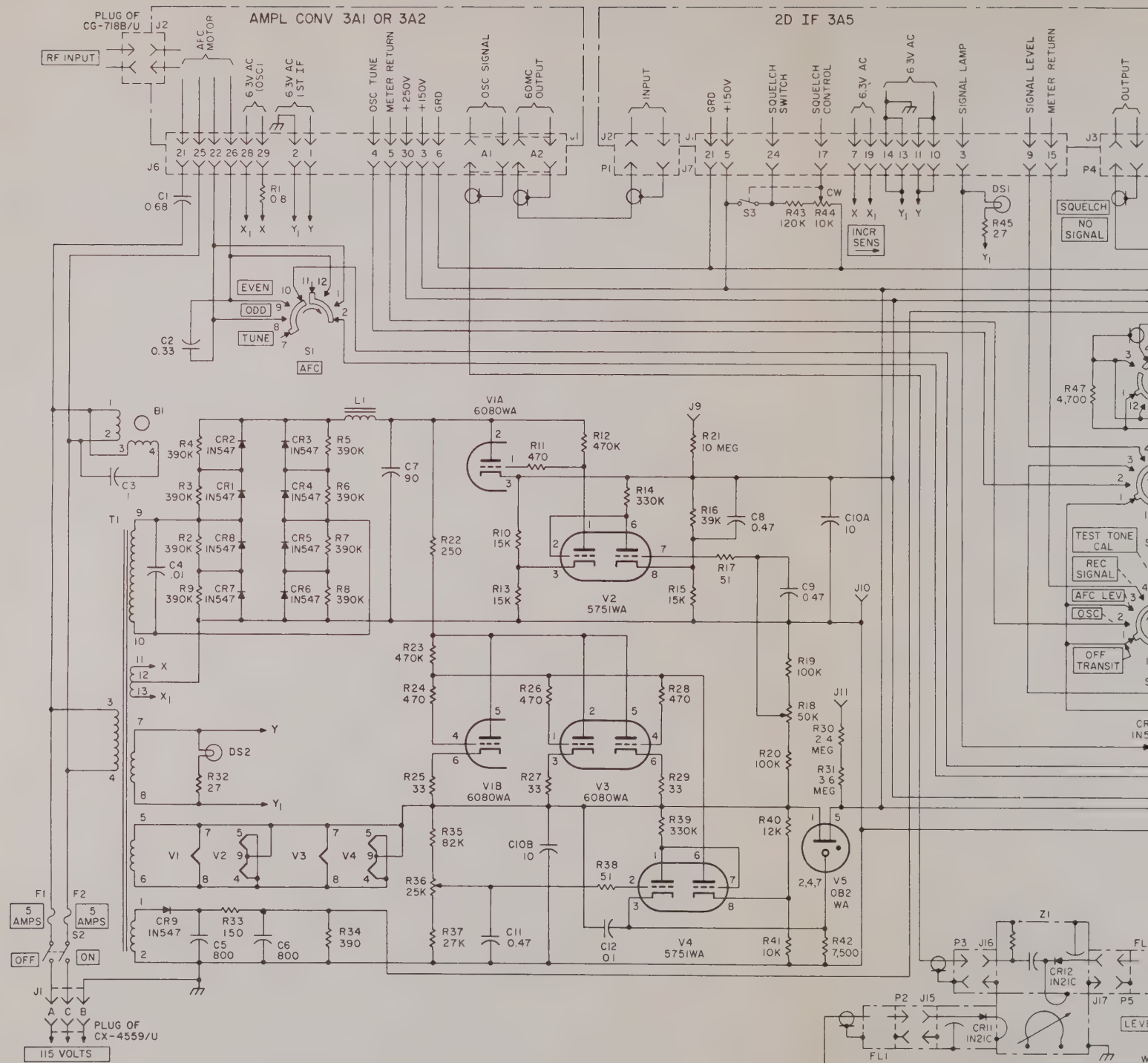
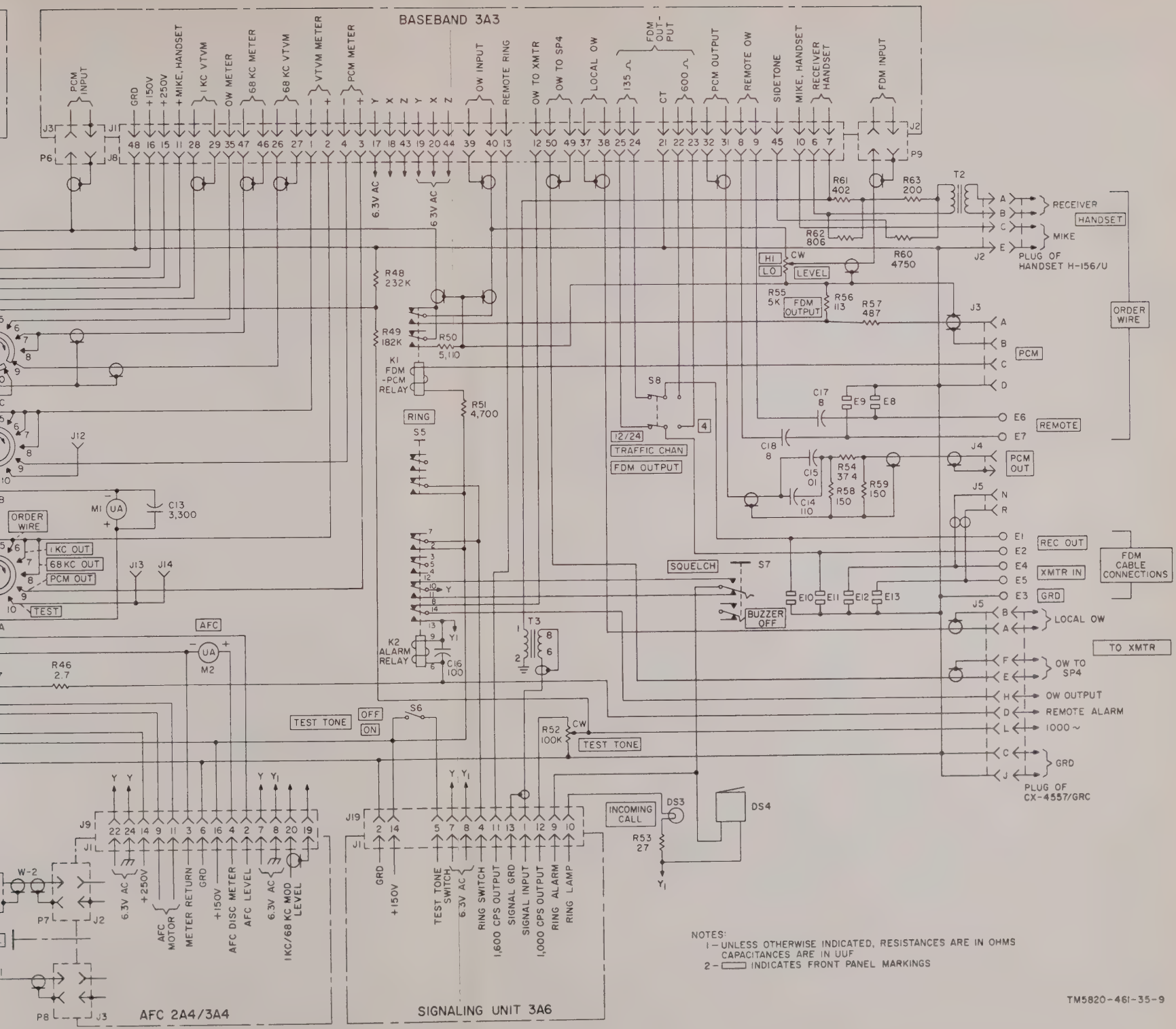


Figure 33. Radio



eceiver R-1148(P)/GRC, main frame schematic diagram.

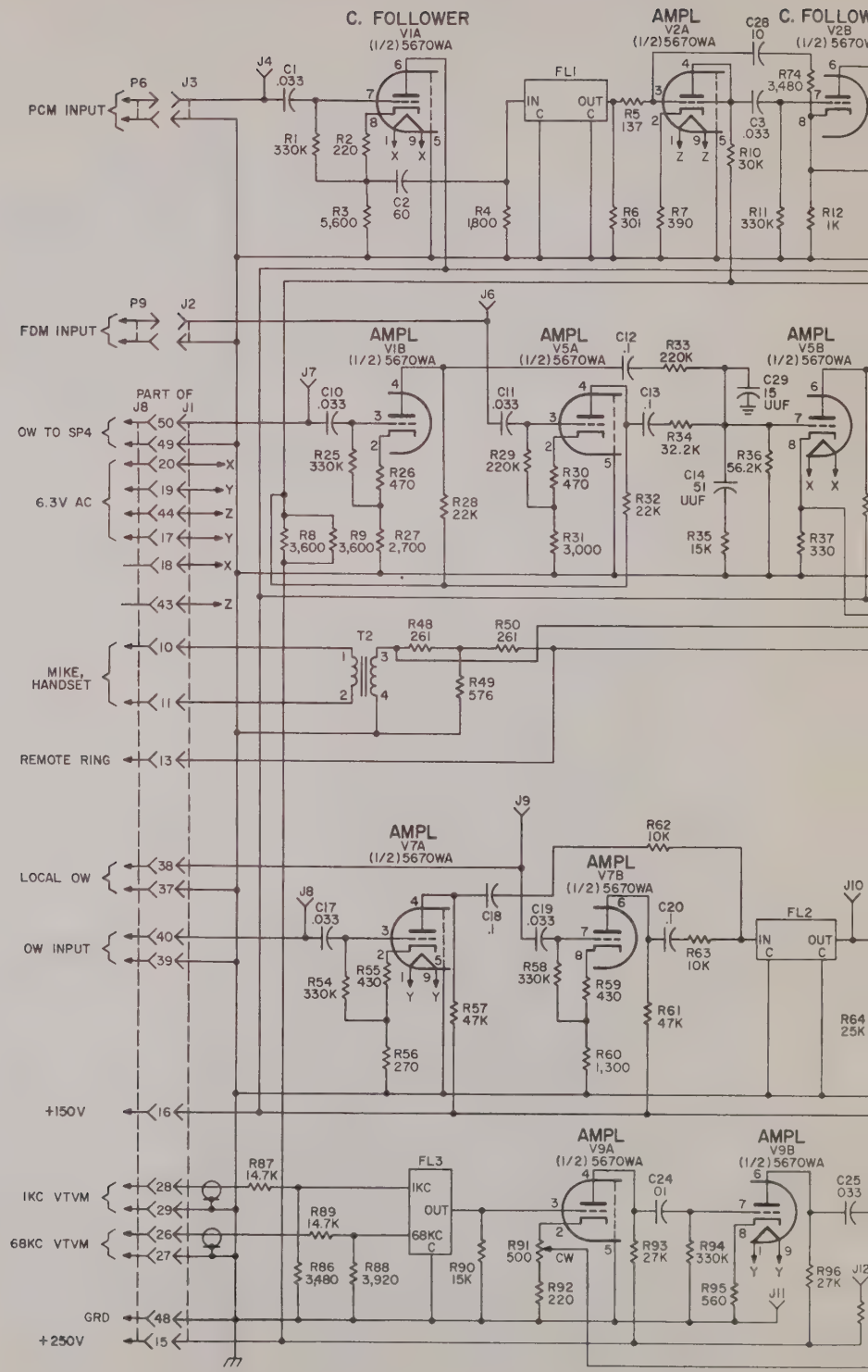
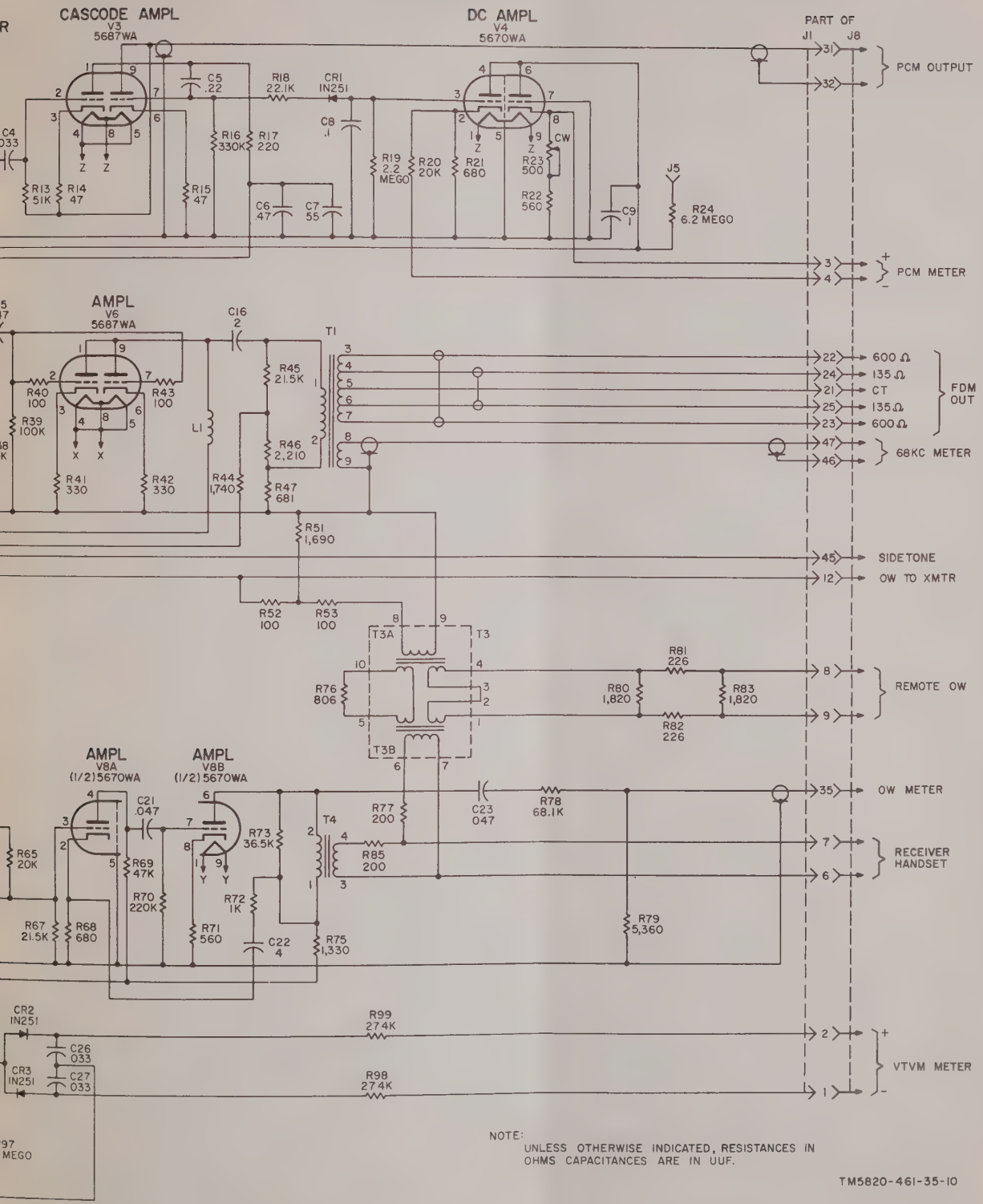
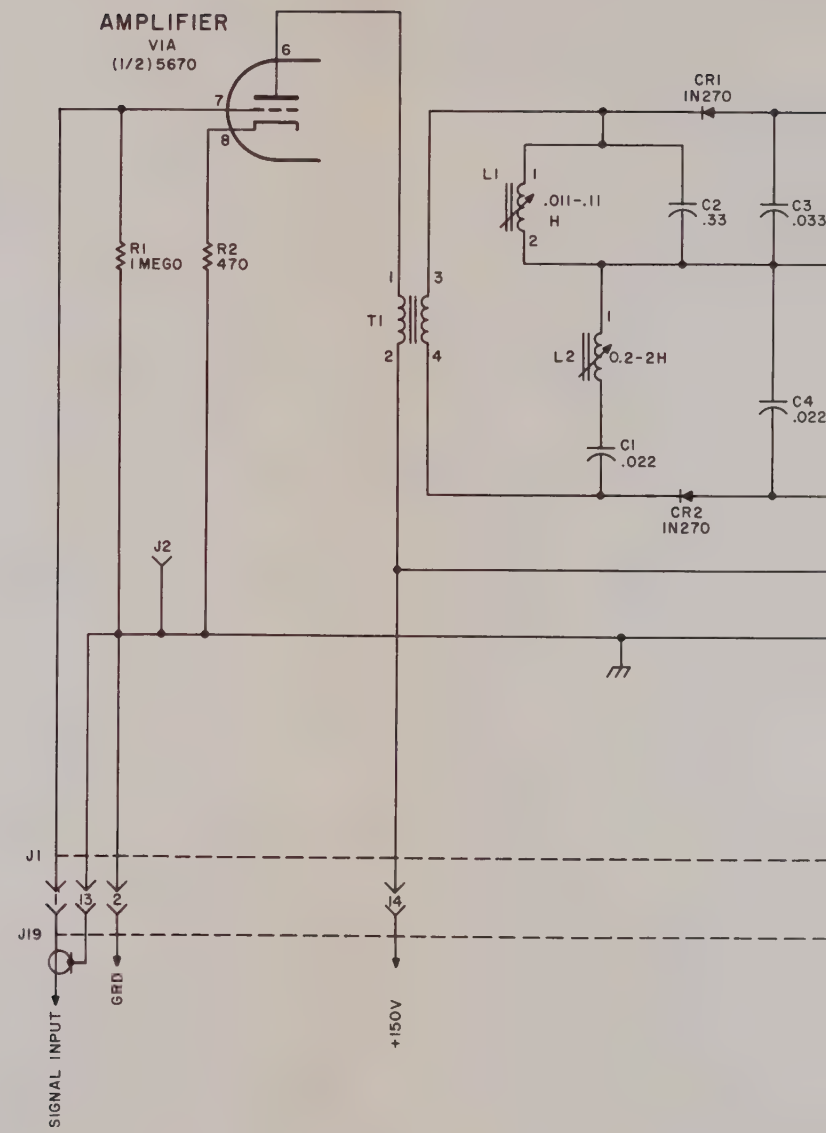
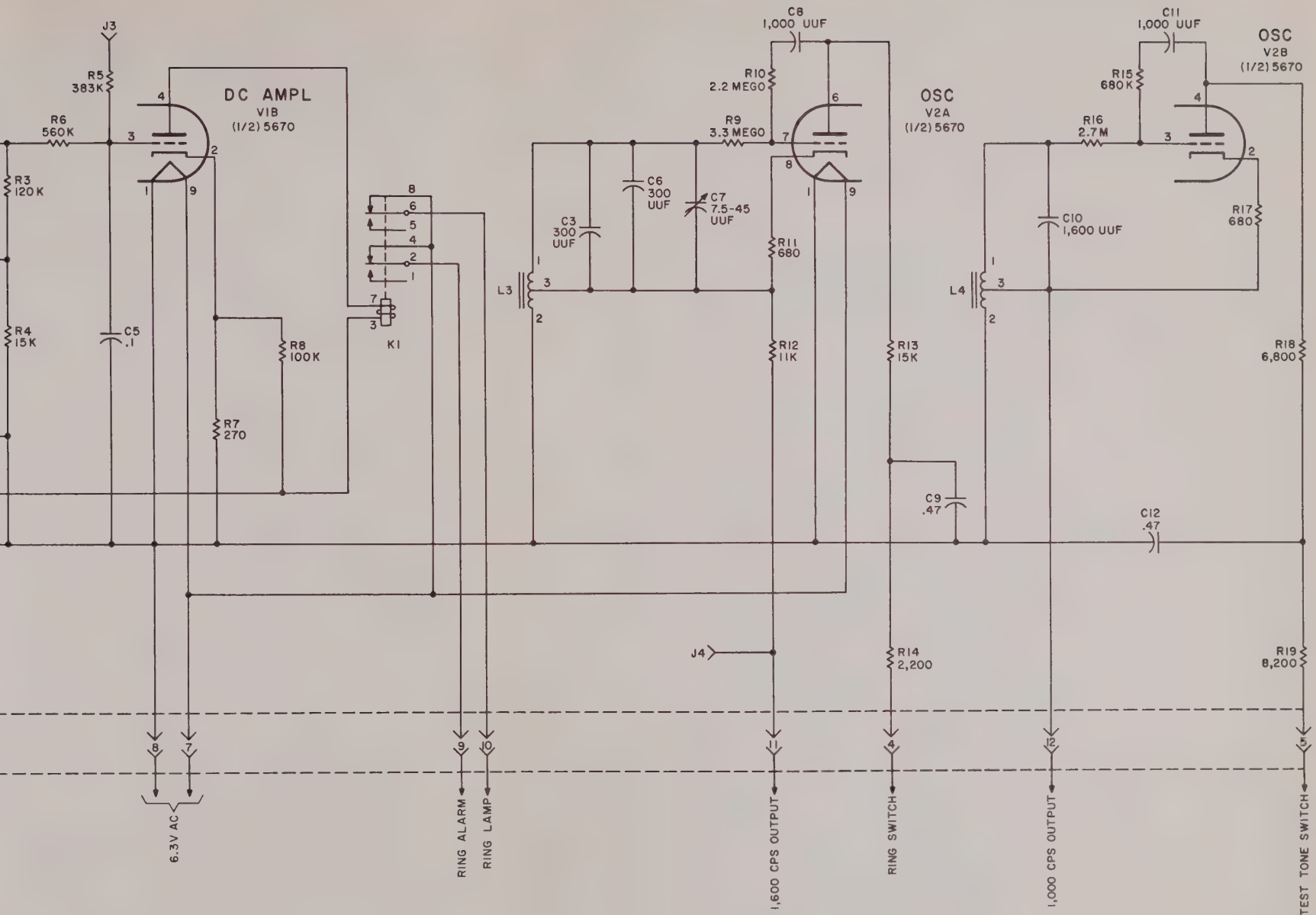

C. FOLLOWER
V1A
(1/2)5670WA
AMPL
V2A
(1/2)5670WA
C. FOLLOW
V2B
(1/2) 5670
PCM INPUT
P6
J3
J4
C1 .033
R1 330K
R2 220
R3 5,600
C2 60
FL1
IN C
OUT C
R4 1800
R5 137
R6 301
R7 390
C28 10
C3 .033
R10 30K
R74 3,480
R11 330K
R12 1K
FDM INPUT
P9
J2
J6
AMPL
V1B
(1/2) 5670WA
AMPL
V5A
(1/2)5670WA
AMPL
V5B
(1/2) 5670WA
J7
C10 .033
C11 .033
C12 .1
C13 .1
R33 220K
R34 32.2K
C29 15 UUF
C14 51 UUF
R25 330K
R26 470
R28 22K
R29 220K
R30 470
R31 3,000
R32 22K
R36 56.2K
R35 15K
R37 330
R8 3,600
R9 3,600
R27 2,700
PART OF
J8
J1
OW TO SP4
6.3V AC
50
49
20
19
44
17
18
43
X
Y
Z
Y
X
Z
MIKE, HANDSET
10
11
T2
R48 261
R50 261
R49 576
REMOTE RING
13
J9
AMPL
V7A
(1/2)5670WA
AMPL
V7B
(1/2)5670WA
R62 10K
J10
J8
C17 .033
C18 .1
C19 .033
C20 .1
R63 10K
FL2
IN C
OUT C
R64 25K
LOCAL OW
38
37
OW INPUT
40
39
R54 330K
R55 430
R56 270
R57 47K
R58 330K
R59 430
R60 1,300
R61 47K
+150V
16
AMPL
V9A
(1/2) 5670WA
AMPL
V9B
(1/2)5670WA
FL3
IKC
OUT
68KC
C
R87 14.7K
R89 14.7K
R86 3,480
R88 3,920
R90 15K
C24 01
C25 033
R91 500
CW
R92 220
R93 27K
R94 330K
R95 560
R96 27K
J11
J12
IKC VTVM
28
29
68KC VTVM
26
27
GRD
48
+250V
15

Figure 34.



...seband assembly 3A3, schematic diagram.


AMPLIFIER
VIA
(1/2) 5670
6
7
8
CR1
IN270
L1
.011-.11
H
C2
.33
C3
.033
R1
1MEGO
R2
470
T1
1
2
3
4
L2
0.2-2H
C4
.022
C1
.022
CR2
IN270
J2
J1
J3
J2
J4
J19
GRD
+150V
SIGNAL INPUT



NOTE:
UNLESS OTHERWISE INDICATED, ALL RESISTANCES ARE IN OHMS
ALL CAPACITANCES ARE IN UF.

Figure 35. Signaling unit 3A6, schematic diagram.

TM5820-461-35-12

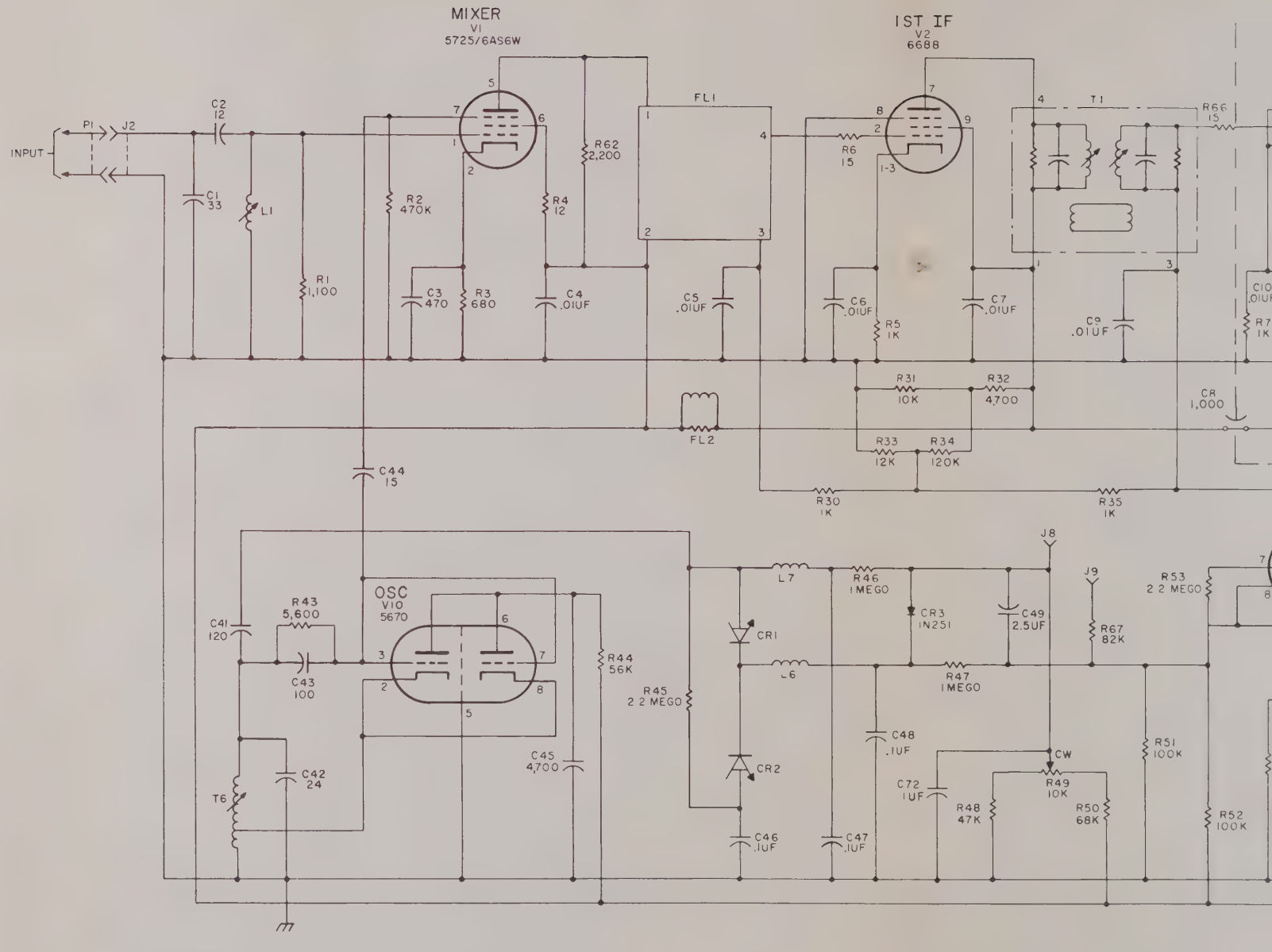
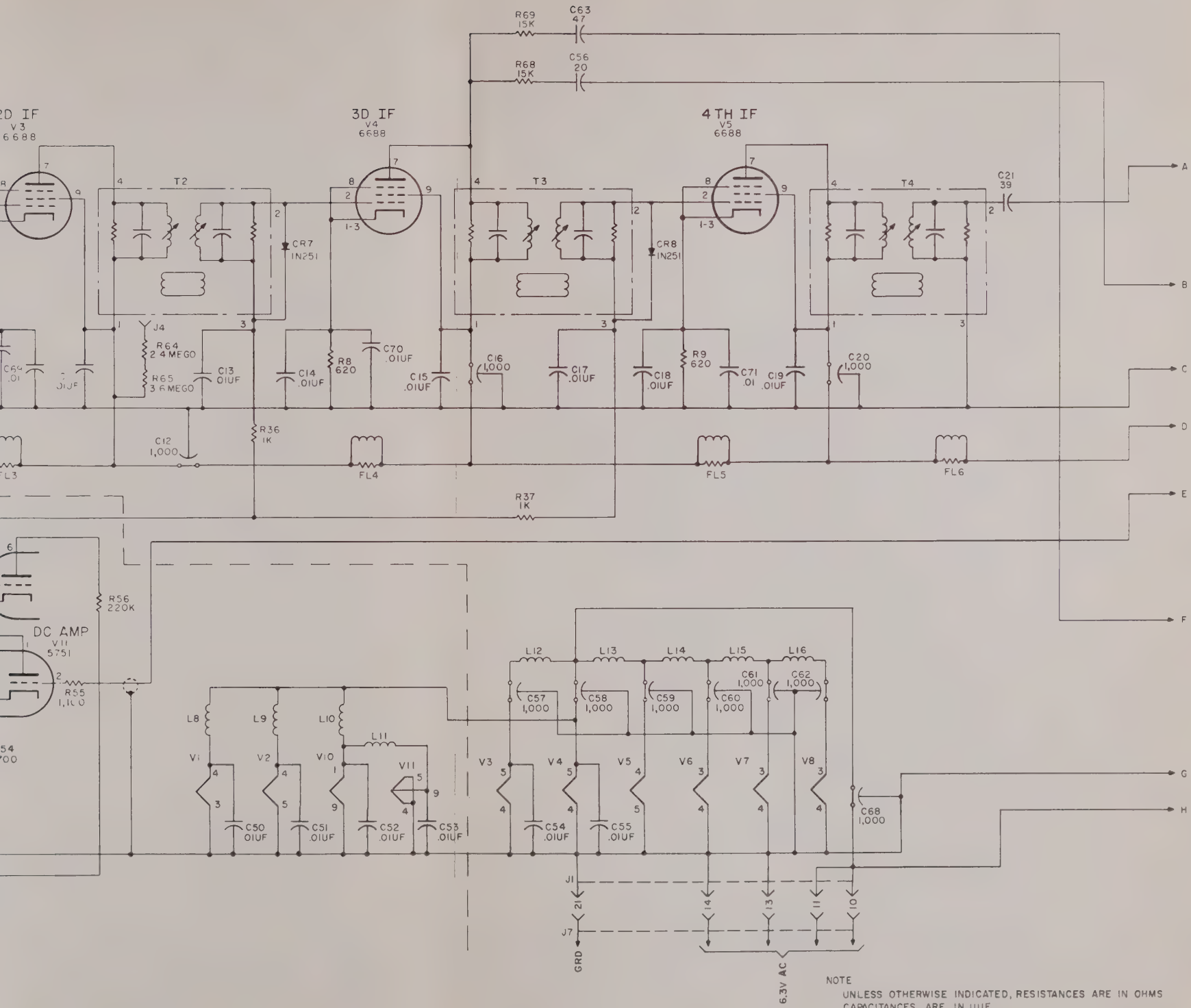


Figure 36(1). Second if. asse



NOTE
UNLESS OTHERWISE INDICATED, RESISTANCES ARE IN OHMS
CAPACITANCES ARE IN UUF

TM5820-461-35-11 (1)

bly 3A5, schematic diagram (part 1 of 2).

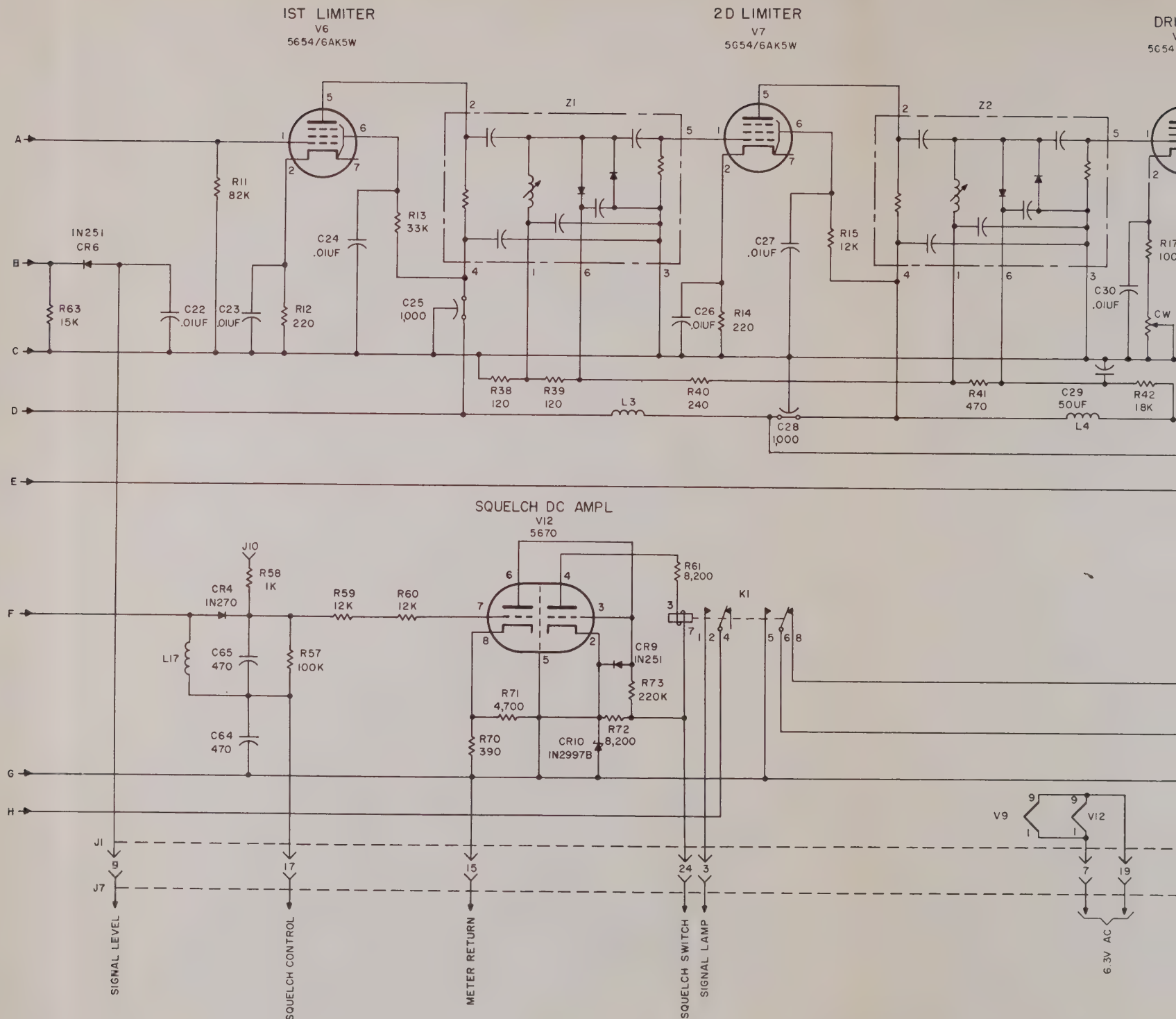
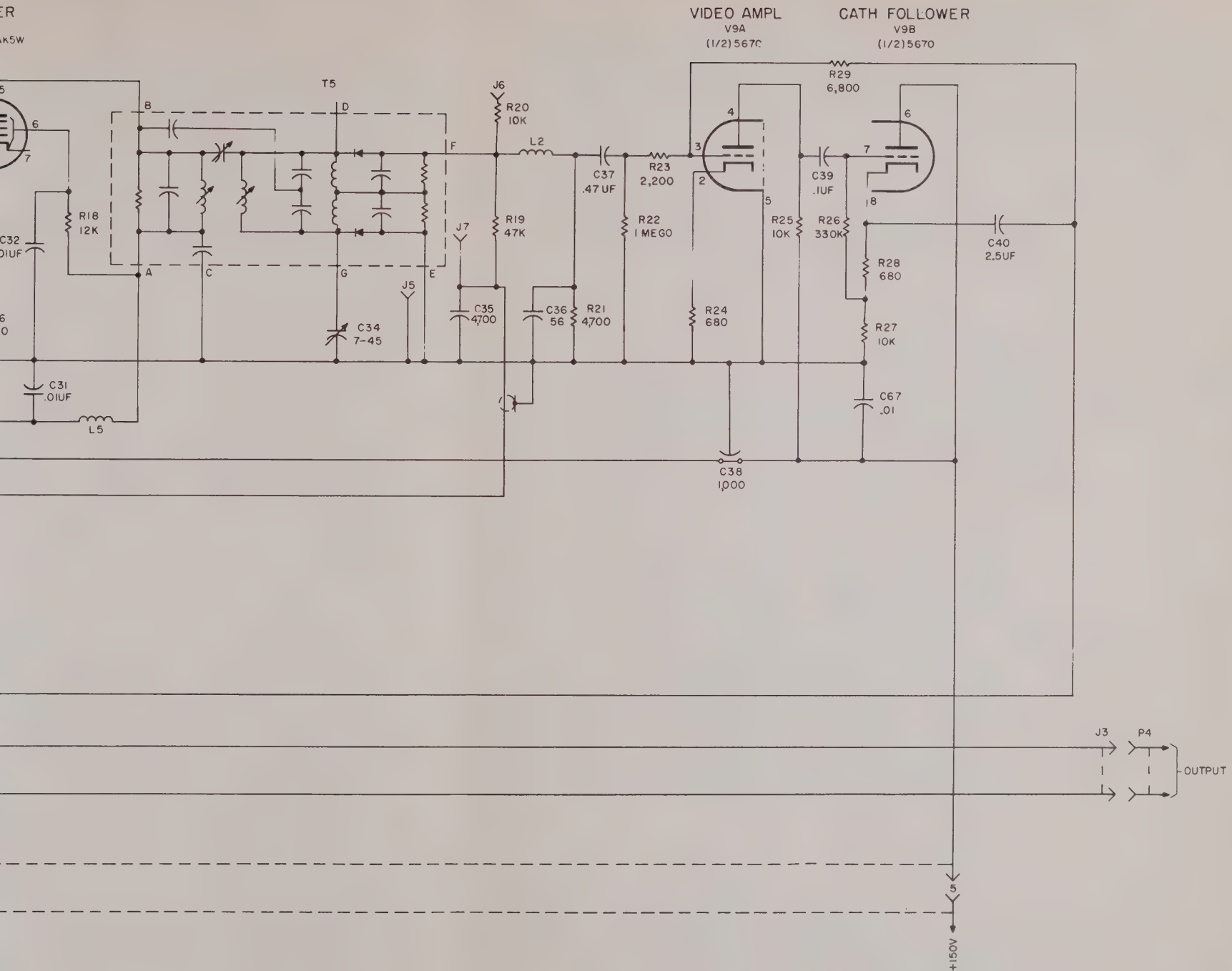


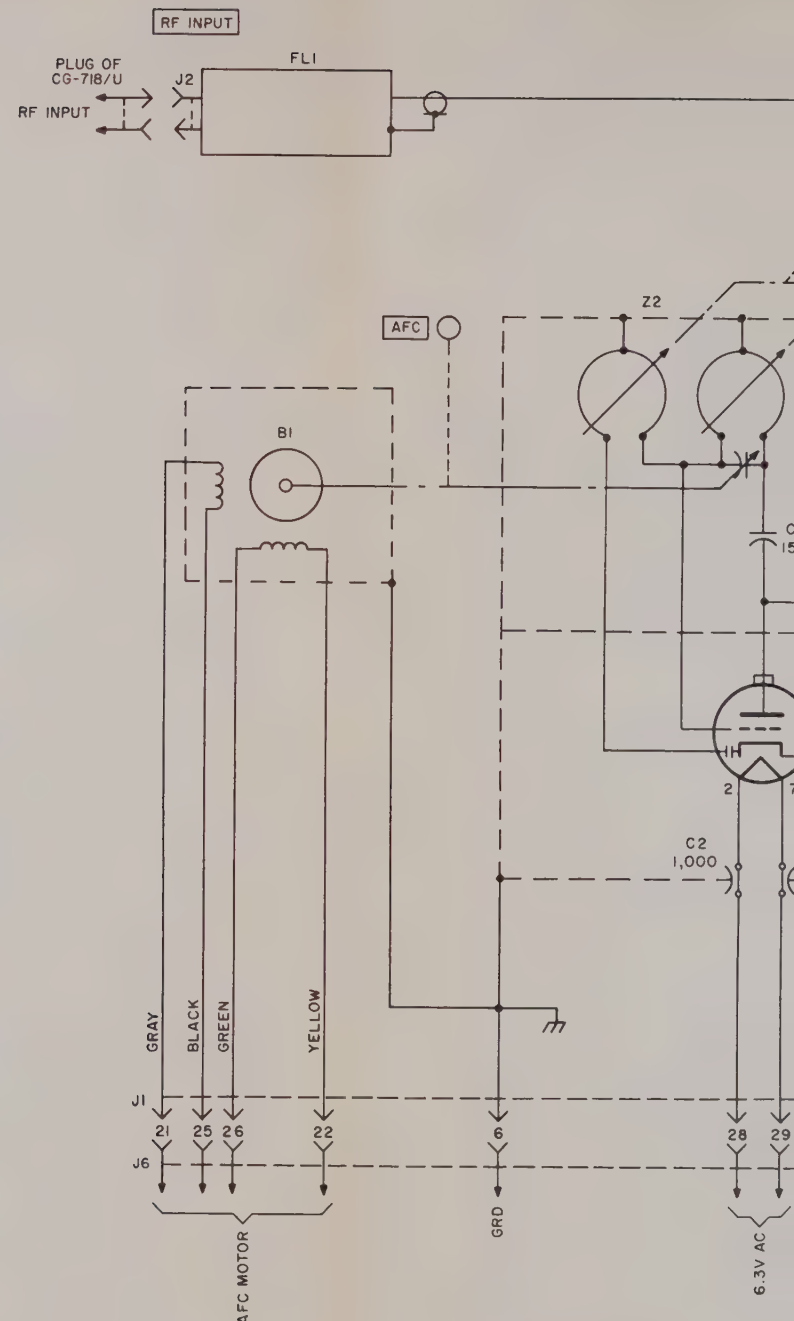
Figure 36(2). Second if.

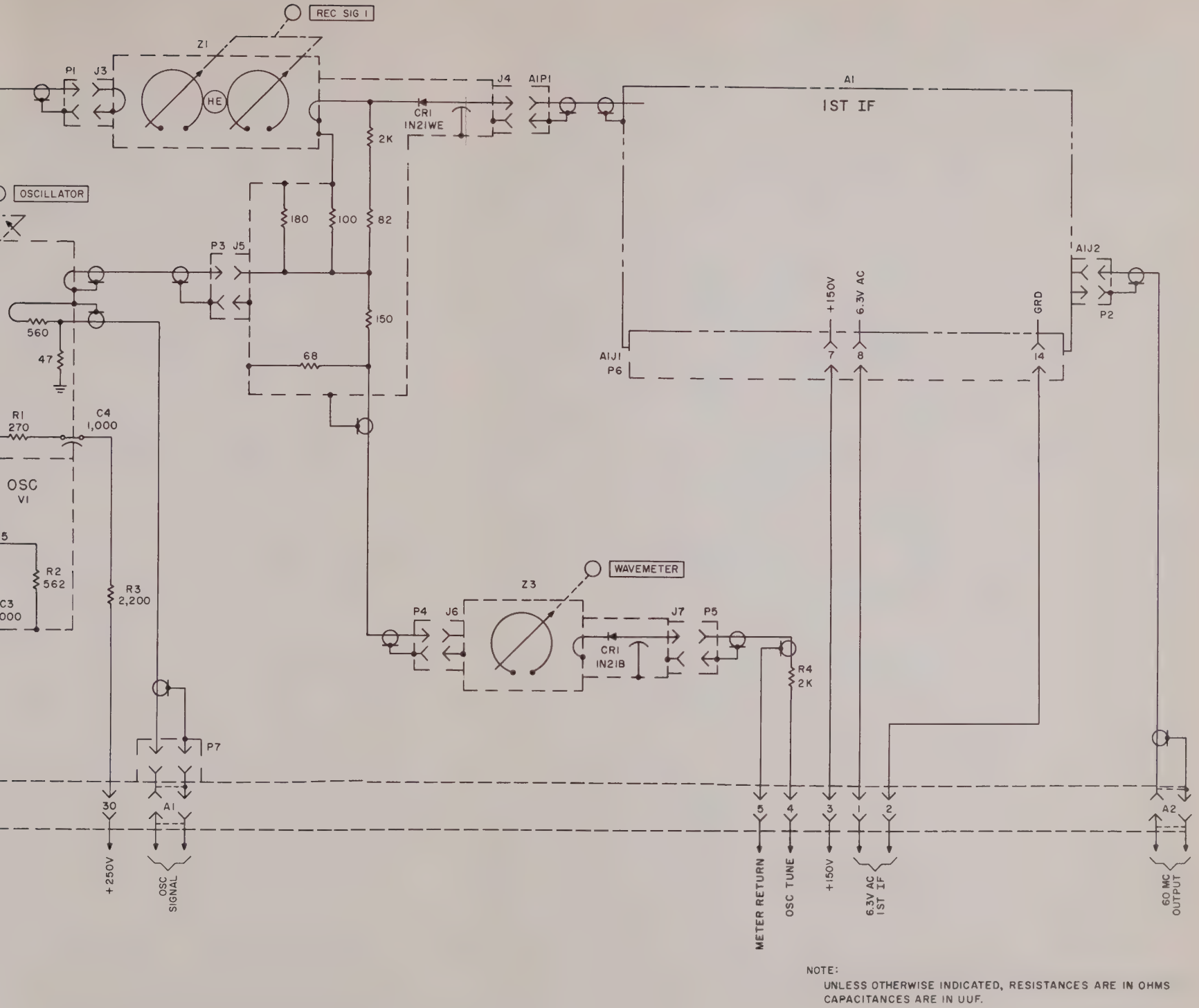


NOTE:
UNLESS OTHERWISE INDICATED, RESISTANCES ARE IN OHMS
CAPACITANCES ARE IN UUF.

TM5820-461-35-11(2)

ssembly 3A5, schematic diagram (part 2 of 2).

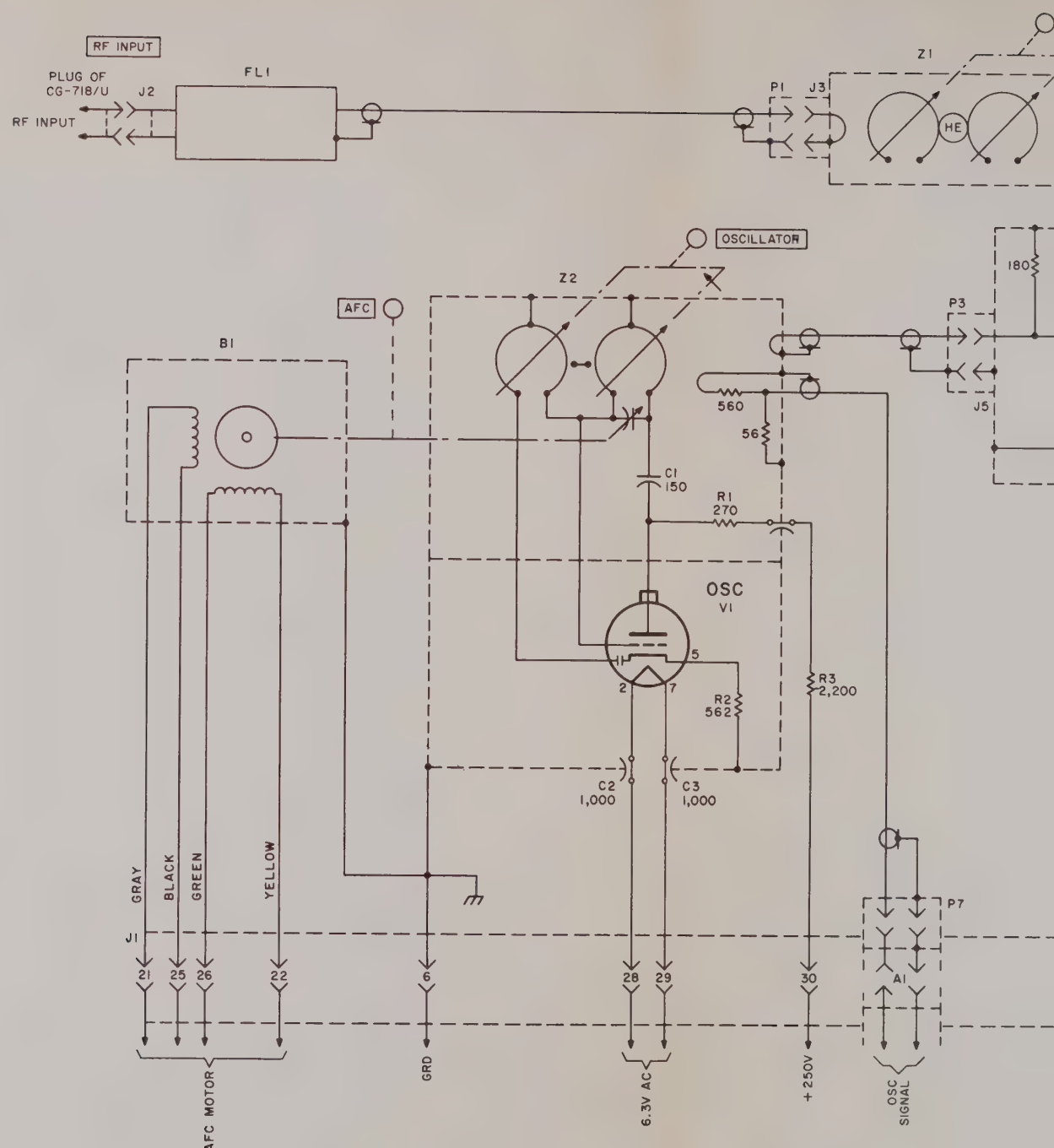

RF INPUT
PLUG OF CG-718/U
RF INPUT
J2
FL1
AFC
Z2
B1
C2
1,000
GRAY
BLACK
GREEN
YELLOW
J1
21
25
26
22
6
28
29
J6
AFC MOTOR
GRD
6.3V AC

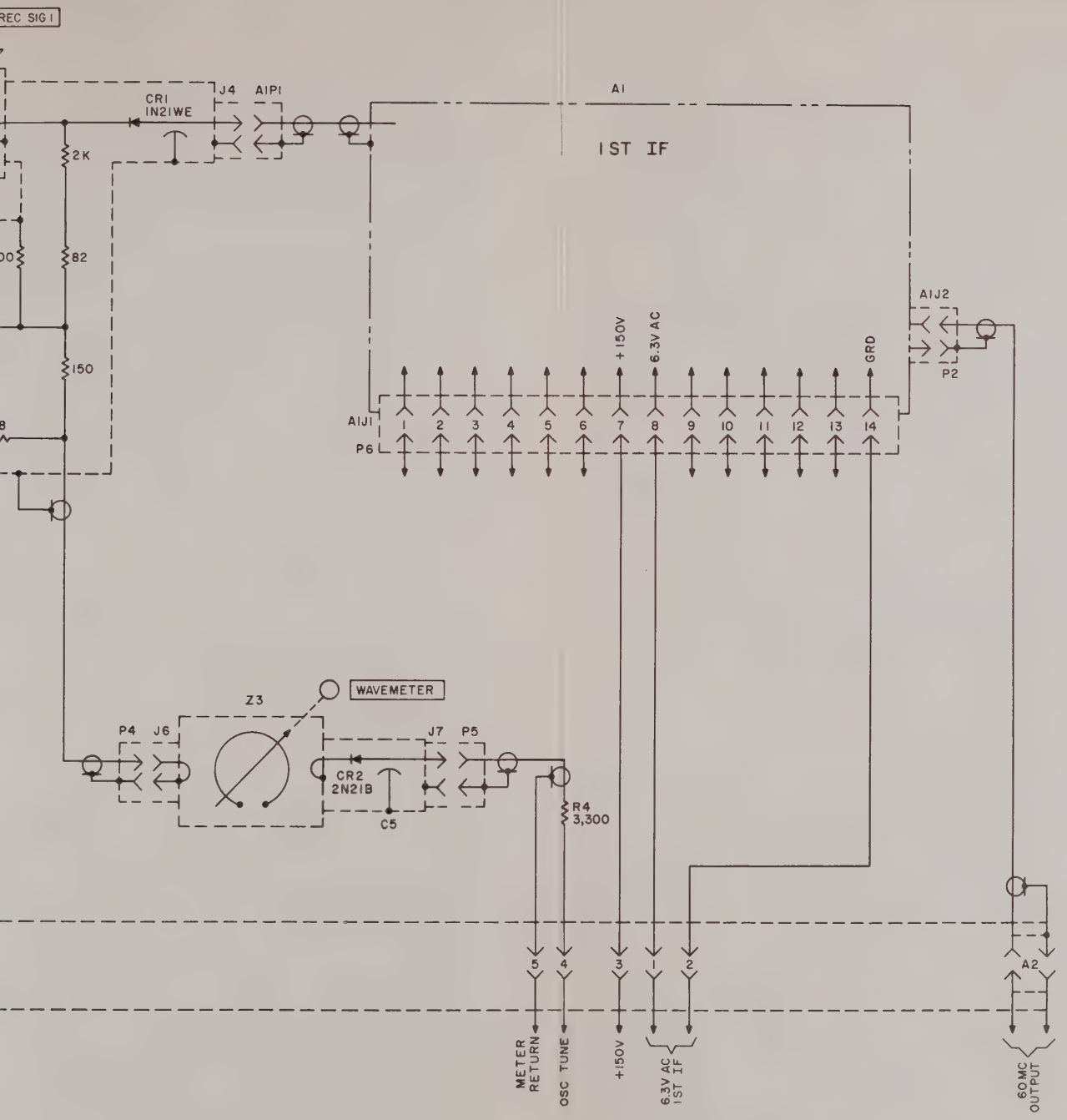


NOTE:
UNLESS OTHERWISE INDICATED, RESISTANCES ARE IN OHMS
CAPACITANCES ARE IN UUF.

Figure 37. Amplifier-Converter AM-1956/GRC, schematic diagram.

TM5820-461-35-14

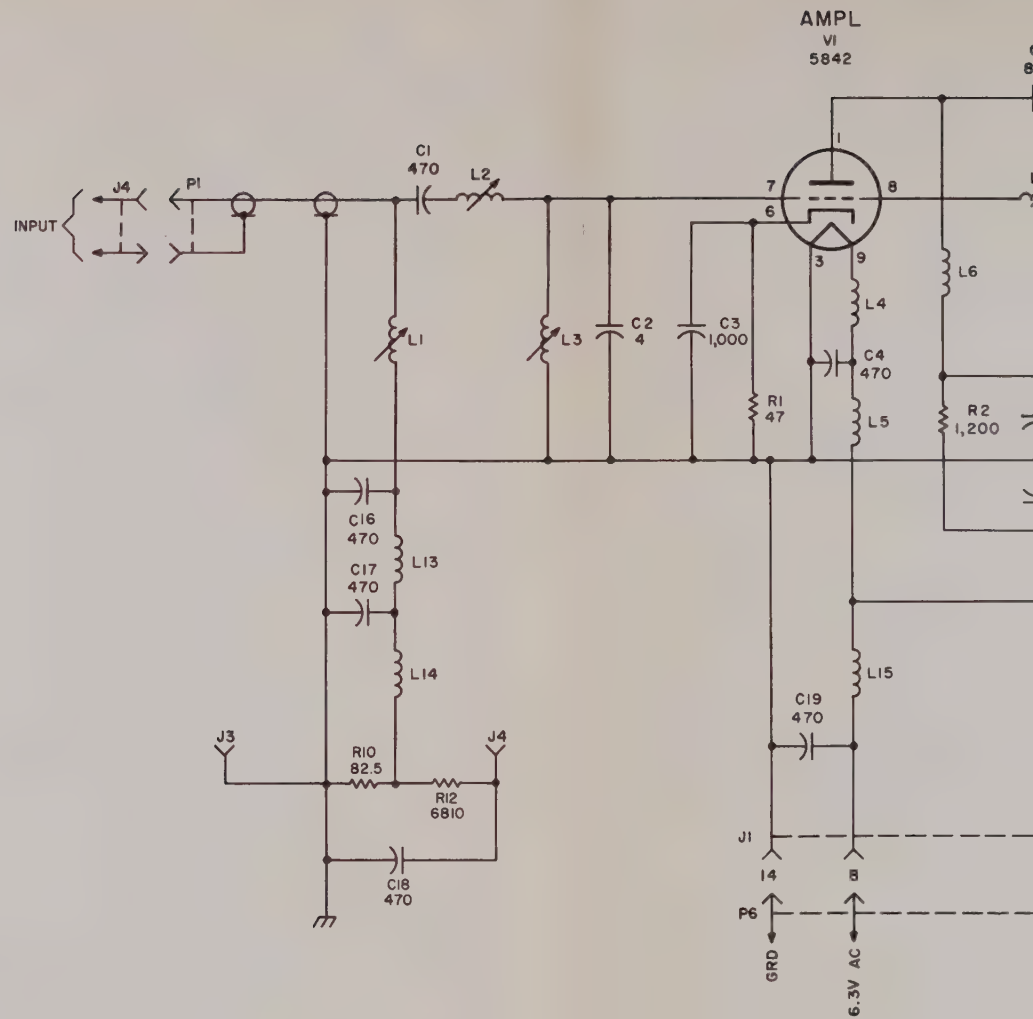

RF INPUT
PLUG OF CG-718/U
J2
RF INPUT
FL1
P1
J3
Z1
HE
OSCILLATOR
AFC
Z2
B1
180
P3
J5
560
56
C1 150
R1 270
OSC V1
5
2
7
R3 2,200
R2 562
C2 1,000
C3 1,000
GRAY
BLACK
GREEN
YELLOW
J1
21
25
26
22
6
28
29
30
P7
A1
AFC MOTOR
GRD
6.3V AC
+250V
OSC SIGNAL



NOTE:
UNLESS OTHERWISE INDICATED, ALL RESISTANCES ARE IN OHMS
ALL CAPACITANCES ARE UUF.

TM5820-461-35-13

igure 38. Amplifier-Converter AM-1955/GRC, schematic diagram.


AMPL
VI
5842
INPUT
J4
P1
C1
470
L2
L1
L3
C2
4
C3
1,000
R1
47
L4
C4
470
L5
L6
R2
1,200
C16
470
L13
C17
470
L14
L15
C19
470
J3
J4
R10
82.5
R12
6810
C18
470
J1
14
8
P6
GRD
6.3V AC

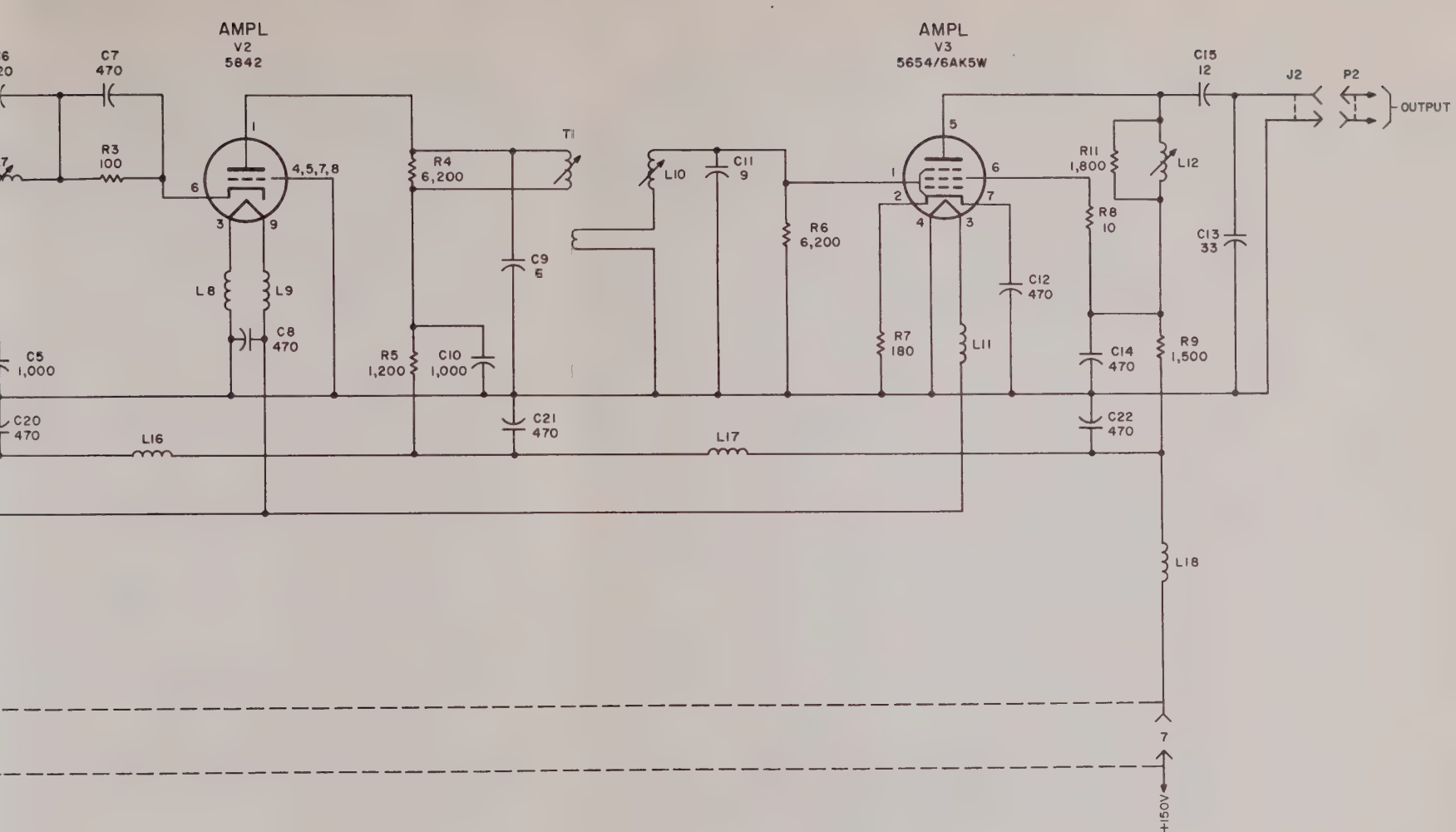


Figure 39. First if. assembly 3A1A1/3A2A1, schematic diagram.

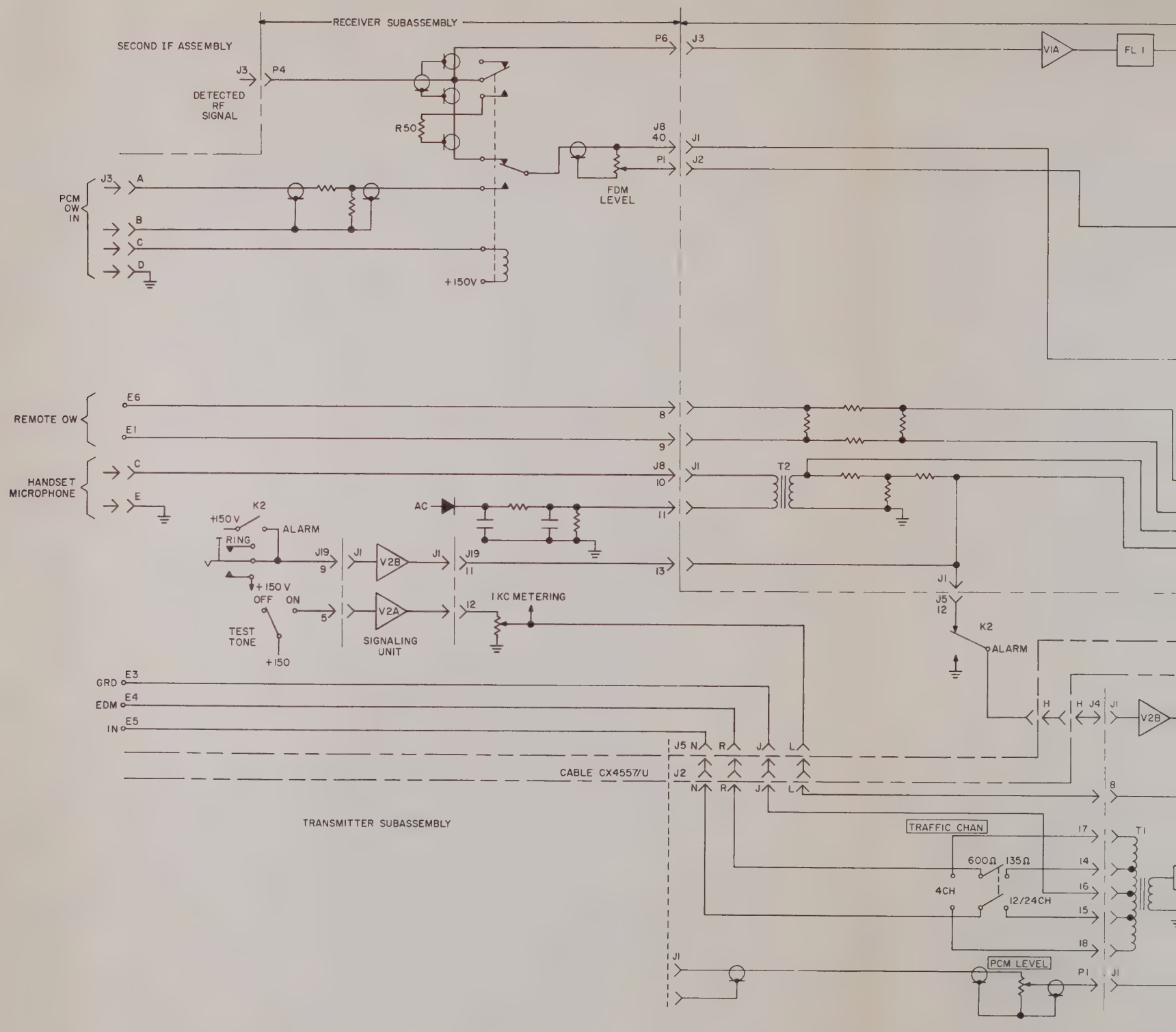
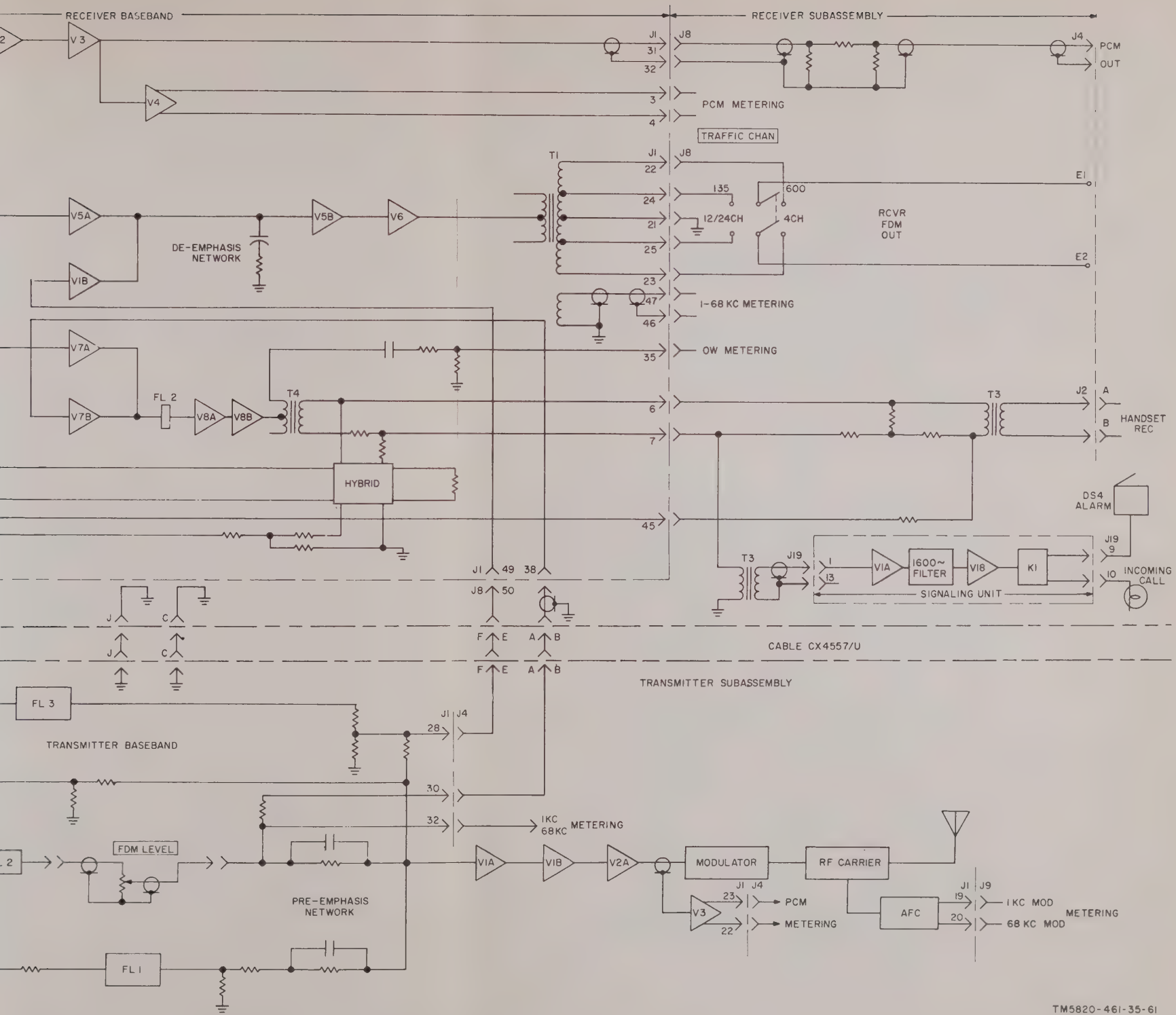


Figure 40. Base band



ssembly 2A3 and 3A3, signal interconnection schematic diagram.

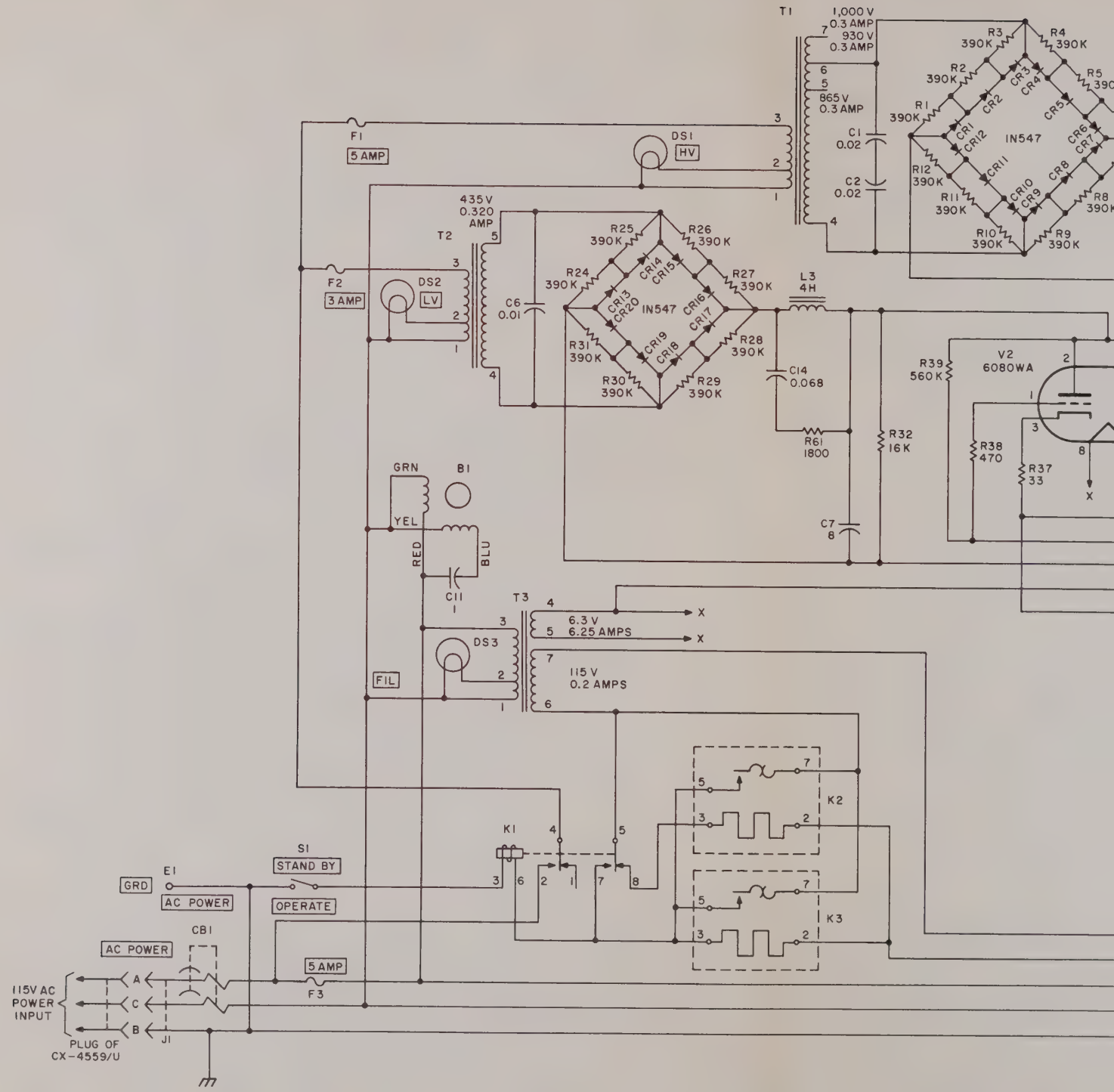
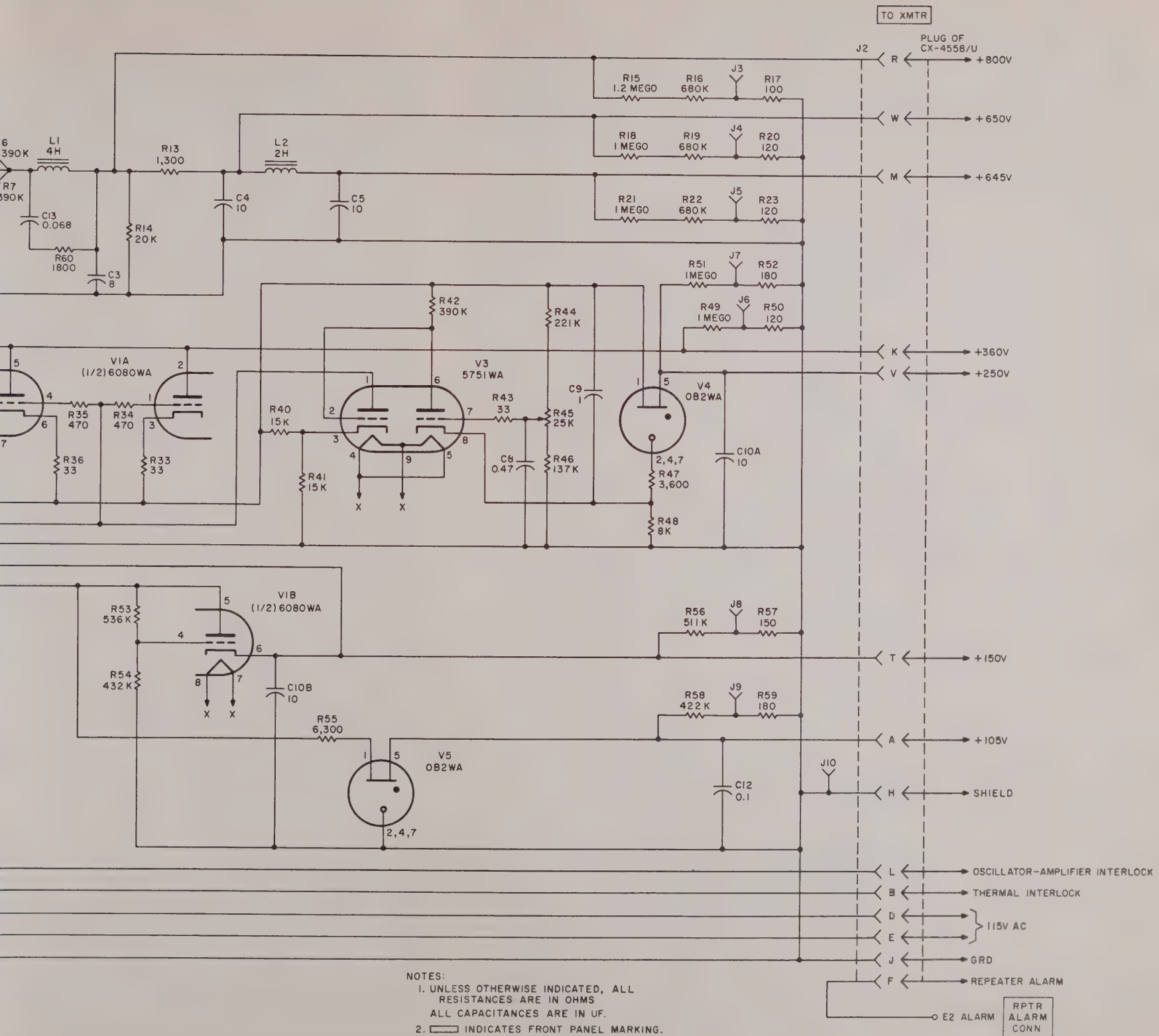


Figure 41. Pow



NOTES:
1. UNLESS OTHERWISE INDICATED, ALL RESISTANCES ARE IN OHMS
ALL CAPACITANCES ARE IN UF.
2. ▭ INDICATES FRONT PANEL MARKING.

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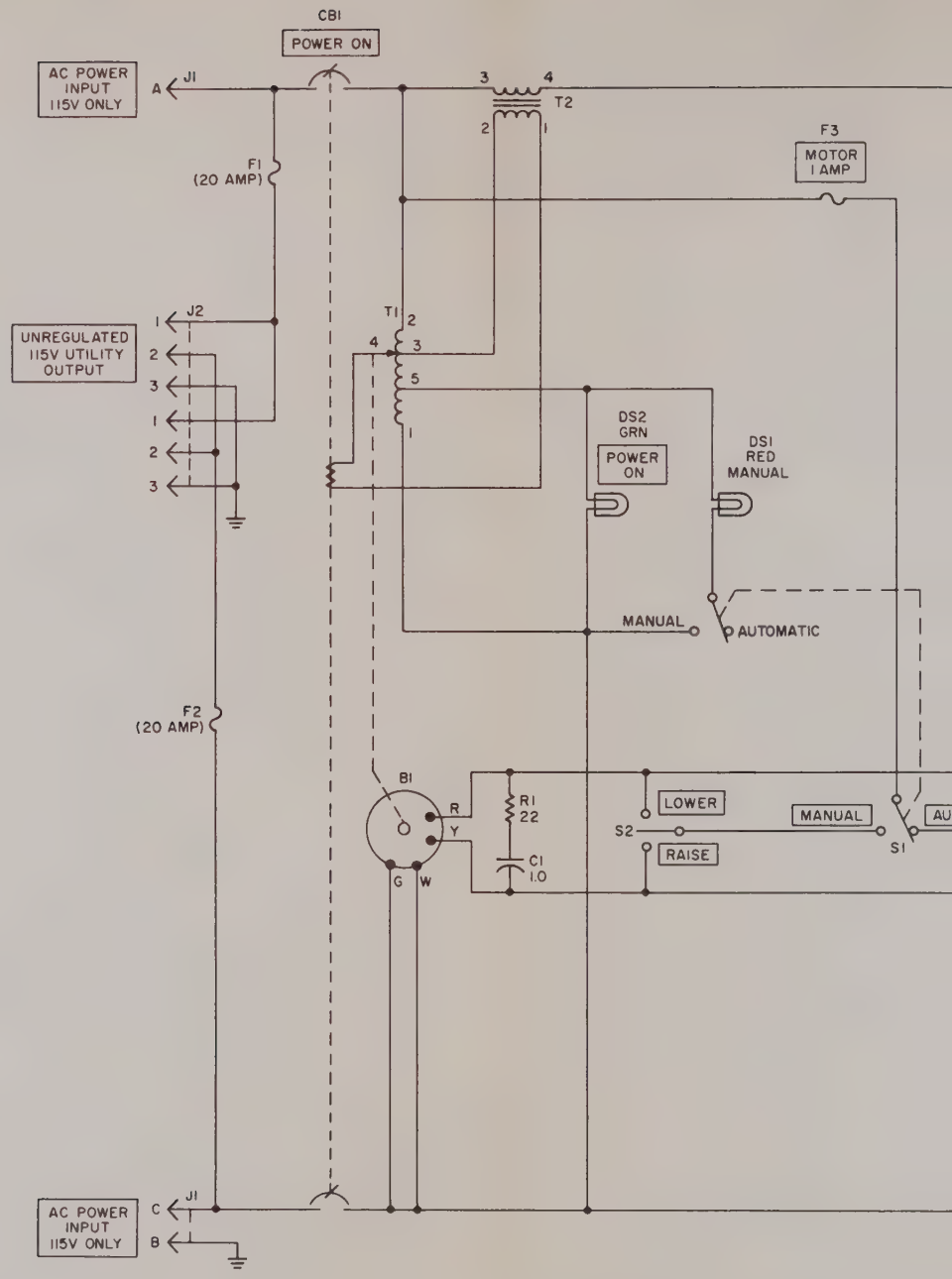
Supply PP-2054/GRC, schematic diagram.


CB1
POWER ON
AC POWER INPUT 115V ONLY
A
J1
3
4
T2
2
1
F3
MOTOR 1 AMP
F1 (20 AMP)
J2
UNREGULATED 115V UTILITY OUTPUT
1
2
3
T1
4
5
DS2 GRN
POWER ON
DS1 RED MANUAL
MANUAL
AUTOMATIC
F2 (20 AMP)
B1
R
Y
G
W
R1 22
C1 1.0
LOWER
S2
RAISE
MANUAL
S1
AC POWER INPUT 115V ONLY
C
B

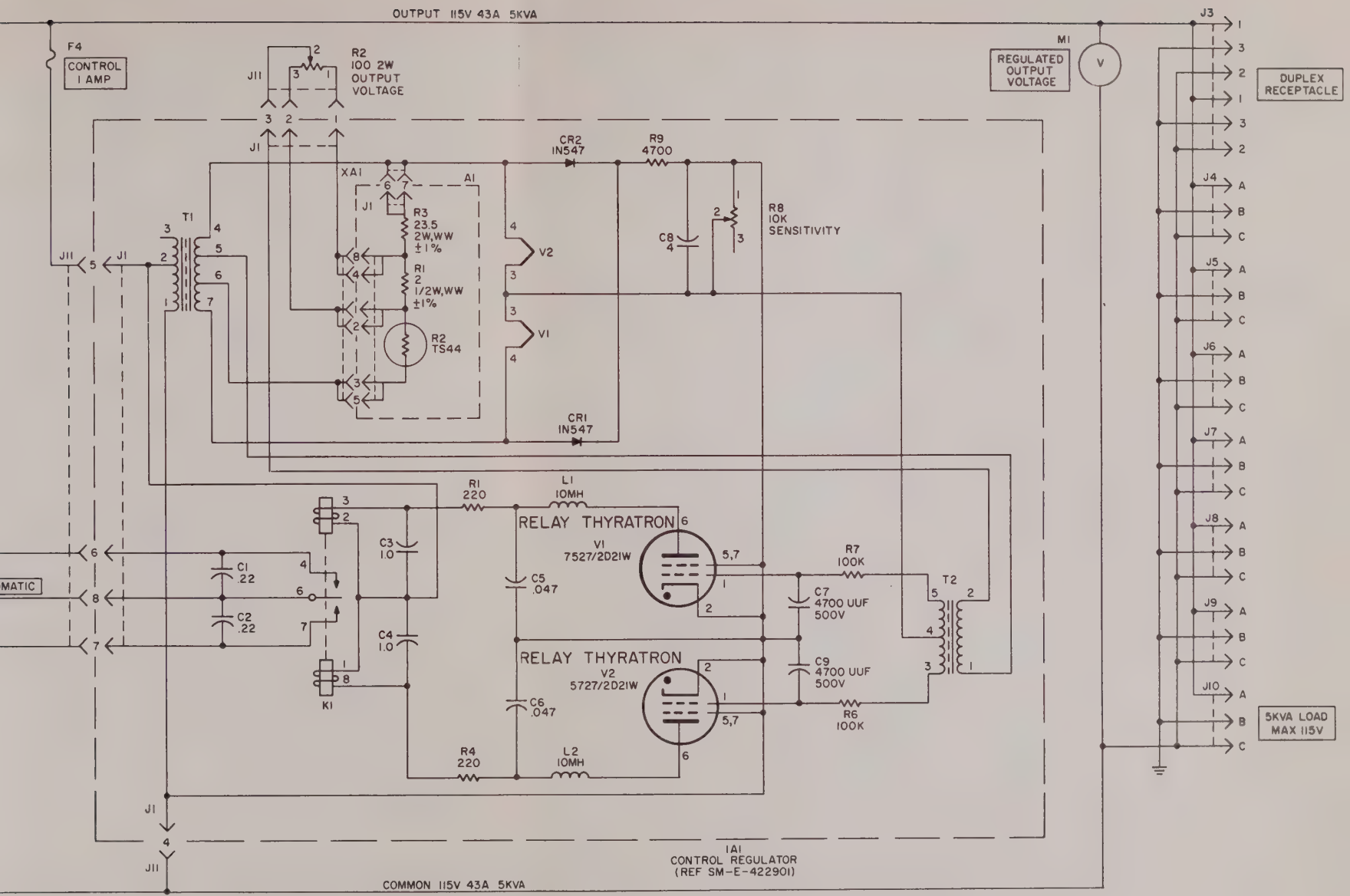


Figure 42. Voltage Regulator CN-514/GRC, schematic diagram.

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By Order of Secretary of the Army:

G. H. DECKER,
General, United States Army,
Chief of Staff.

Official:

J. C. LAMBERT,
Major General, United States Army,
The Adjutant General.

Distribution:

Active Army:

DASA (6)
USASA (2)
CNGB (1)
Tech Stf, DA (1) except
CSigO (14)
Tech Stf Bd (1)
USCONARC (5)
USAARTYBD (1)
USAARMBD (2)
USAIB (1)
USARADBD (2)
USAAVNBD (1)
USA Abn Elct & SPWAR Bd (1)
USAATBD (1)
ARADCOM (2)
ARADCOM Rgn (2)
OS Maj Comd (3)
OS Base Comd (2)
LOG Comd (2)
MDW (1)
Armies (2)
Corps (2)
Instl (2)
Ft Monmouth (63)
USATC AD (2)
USATC Eng (2)
USATC Inf (2)
USATC FA (2)
USATC Armor (2)
USAOMC (2)
Svc Colleges (2)
Br Svc Sch (2)
Gen Dep (2) except
Atlanta (none)
Sig Sec, Gen Dep (5)
Sig Dep (12) except
Sacramento Sig Dep (17)
WRAMC (1)
USA Trans Tml Comd (1)
Army Tml (1)
POE (1)
OSA (1)
USAEPG (2)
AFIP (1)
AMS (1)
Army Pictorial Cen (2)
EMC (1)
Yuma Test Sta (2)
USA Strat Comm Comd (4)
USASSA (25)
USASSAMRO (1)
USARCARIB Sig Agcy (1)
USA Sig Msl Spt Agcy (13)
Sig Fld Maint Shops (3)
Def Log Svc Cen (1)
USA Corps (3)
JBUSMC (2)
Units org under fol TOE:
Two copies each unit UNOINDC:
11-7
11-16
11-57
11-98
11-117
11-155
11-157
11-500 (AA-AE) (4)
11-557
11-587
11-592
11-597
11-597

NG: State AG (3).
USAR: None.
For explanation of abbreviations used, see AR 320-50.